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Draft

F-35 Force Development Evaluation and Weapons School Beddown Environmental Impact Statement

United States Air Force
Air Combat Command

March 2008

LIST OF ACRONYMS AND ABBREVIATIONS

ABW	Air Base Wing
ACAM	Air Force Conformity Applicability Model
ACC	Air Combat Command
ACEC	Area of Critical Environmental Concern
ACM	Asbestos-Containing Material
ACMI	Air Combat Maneuvering Instrumentation
ABW	Air Base Wing
AFB	Air Force Base
AFI	Air Force Instruction
AFOSH	Air Force Occupational Safety and Health
afy	Acre Feet Per Year
AGE	Aerospace Ground Equipment
AGL	Above Ground Level
AGM	Air-to-Ground Missile
AICUZ	Air Installation Compatible Use Zone
AMU	Aircraft Maintenance Unit
APZ	Accident Potential Zone
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
AWACS	Airborne Warning and Control System
BAQ	Bureau of Air Quality
BASH	Bird/Wildlife-Aircraft Strike Hazard
BLM	Bureau of Land Management
BO	Biological Opinion
BRAC	Base Closure and Realignment Commission
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CCWRD	Clark County Water Reclamation District
CDNL	C-Weighted Day-Night Average Sound Level
CERCLA	Comprehensive Environmental Response, Compensations, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CTOL	Conventional Take-off and Landing
CWA	Clean Water Act
CZ	Clear Zone
DAQEM	Department of Air Quality and Environmental Management
dB	Decibel
DNL	Day-Night Average Sound Level
DNWR	Desert National Wildlife Range
DoD	Department of Defense
DOE	Department of Energy
DOI	Department of Interior
DRC	Document Review Committee
DRMO	Defense Reutilization and Marketing Office
DWMA	Desert Wildlife Management Area
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
EOD	Explosive Ordnance Disposal
EPA	United States Environmental Protection Agency
ERP	Environmental Restoration Program
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FDE	Force Development Evaluation
FLPMA	Federal Land Policy and Management Act
FY	Fiscal Year
gpd	Gallons Per Day
GPS	Global Positioning System
H_2S	Hydrogen Sulfide
HAP	Hazardous Air Pollutant
HAZMAT	Hazardous Materials
HMA	Herd Management Area
HTTC	High Technology Training Complex
ICRMP	Cultural Resources Management Plan
IFR	Instrument Flight Rules
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
IOC	Initial Operational Capabilities
JAST	Joint Advance Strike Technology
JDAM	Joint Direct Attack Munitions
JSF	Joint Strike Fighter
kV	Kilovolt
L	Sound Level
LBP	Lead-Based Paint
L_{dnmr}	Onset Rate-Adjusted Monthly Day-Night Average Sound Level
L/O	Low Observables
LOLA	Live Ordnance Loading Area
MAILS	Multiple Aircraft Instantaneous Line Source
MLWA	Military Land Withdrawal Act
MOA	Military Operations Area
MOU	Memorandum of Understanding
MOUT	Military Operations in Urban Terrain

mm	Millimeter
MRTFB	Major Range and Test Facility Base
MSA	Munitions Storage Area
MSL	Mean Sea Level
MTR	Military Training Route
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NACTS	Nellis Air Combat Tracking System
NAP	Native American Program
National Register	National Register of Historic Places
NDOT	Nevada Department of Transportation
NDEP	Nevada Division of Environmental Protection
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
nm	Nautical Mile
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxide
NOI	Notice of Intent
NOTAM	Notice to Airmen
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
NTTR	Nevada Test and Training Range
NV	Nevada
NWR	National Wildlife Refuge
O_3	Ozone
OSHA	Occupational Safety and Health Act
OT&E	Operational Test and Evaluation
Pb	Lead
PCBs	Polychlorinated Biphenyls
PL	Public Law
PM_{10}	Particulate Matter Less than 10 Microns
$PM_{2.5}$	Particulate Matter Less than 2.5 Microns
PSD	Prevention of Significant Deterioration
psf	Per Square Foot
RANW	Range Wing
RCRA	Resource Conservation and Recovery Act
REDHORSE	Rapid Engineers Deployable Heavy Operational Repair Squadron Engineer
RFMDS	Red Flag Measurement and Debriefing System
RMP	Resource Management Plan
ROD	Record of Decision
SAM	Surface-to-Air Missile
SEL	Sound Exposure Level
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SP	State Park
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxide
TCE	trichloroethylene
UAS	Unmanned Aerial System
USACE	United States Army Corps of Engineers
USAFWC	United States Air Force Warfare Center
U.S.C.	United States Code
USCB	United States Census Bureau
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
VFR	Visual Flight Rules
VRM	Visual Resources Management
WG	Wing
WGEF	Wind Generating Energy Facility
WINDO	Wing Infrastructure Development Outlook
WMA	Wildlife Management Area
WS	Weapons School
WSA	Weapons Storage Area

Privacy Advisory for the Draft EIS

Any letters or written comments received on this Draft Environmental Impact Statement (EIS) may be published in the Final EIS. As required by law, the Air Force will consider those comments in the Final EIS which will be made available to the public. Any personal information provided will be used only to identify your desire to make a comment during the public availability period or to fulfill a request for copies of the EIS. Private address information provided with comments will be used solely to develop a mailing list for the Final EIS distribution and will not be otherwise released.

Draft

F-35 Force Development Evaluation and Weapons School Beddown Environmental Impact Statement

United States Air Force
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March 2008

F-35 FORCE DEVELOPMENT EVALUATION (FDE) AND WEAPONS SCHOOL (WS) BEDDOWN DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Responsible Agency: United States Air Force, Air Combat Command

Proposed Action: The Air Force proposes to base 36 F-35 fighter aircraft at Nellis Air Force Base (AFB), Nevada between 2012 and 2022. The aircraft would be assigned to the Force Development Evaluation (FDE) program and Weapons School (WS) at Nellis AFB. Flight activities would occur at Nellis AFB and Nevada Test and Training Range (NTTR). The F-35 beddown would also require construction of new facilities, and alteration and demolition of existing facilities at Nellis AFB.

Written comments are requested by May 19, 2008 and inquiries regarding this document should be directed to:

HQ ACC/A7PP
129 Andrews St., Ste 122
Langley AFB, VA 23665-2769
ATTN: Ms. Sheryl Parker

In addition, the document can be viewed on and downloaded from the World Wide Web at www.accplanning.org and www.nellis.af.mil/library/environment.asp.

Designation: Draft Environmental Impact Statement

Abstract: The F-35 Joint Strike Fighter (JSF) is being developed to replace and supplement Air Force legacy fighter and attack aircraft consisting of the F-16 Fighting Falcon and A-10 Thunderbolt II. Federal law and United States Air Force (Air Force) policy require implementation of an FDE program and WS training of all new aircraft. To meet these requirements for the F-35, the Air Force proposes to base 12 F-35 aircraft at Nellis AFB for the FDE program and an additional 24 F-35 for WS training. As a phased program reliant on manufacturing progress and other elements of F-35 deployment, the first F-35 would arrive in 2012 and the last in 2022. This proposal would also involve construction, demolition, or modification of base facilities and implementation of flight activities for the FDE program and WS within the NTTR. This Draft EIS analyzes the potential environmental consequences of the proposed beddown at Nellis AFB and the no-action alternative. Under the no-action alternative, the FDE program and WS would not be implemented at Nellis AFB. None of the associated construction or personnel changes would occur. The findings indicate that the proposed F-35 beddown would not adversely impact airspace and aircraft operations, safety, recreation, socioeconomics, environmental justice and protection of children, soils, water, biological resources, cultural resources, or hazardous materials and waste. The proposed action would contribute less than 1 percent of all regional criteria pollutant emissions annually, and emissions would remain well below the 10 percent threshold for regional significance. Emissions of CO and NO_x would exceed *de minimus*, but these would not result in adverse impacts or affect Clark County's attainment goals based on State Implementation Plans for the pollutants. The proposed beddown would increase noise levels around Nellis AFB based on analyses using currently available data on the F-35. Under the proposed action, there would be an overall increase in the number of people affected and the land area exposed to DNL noise levels of 65 dB or greater. Currently, noise levels of 65 DNL or greater affect a large number of minority populations and to a lesser extent low-income populations and that trend would continue under the proposed action. These populations live in areas already zoned for land uses above 65 DNL but Nellis AFB would continue to employ noise abatement procedures to reduce noise effects in the surrounding communities. The Air Force would also continue to assist local officials who seek to establish or modify noise attenuation measures for residences. For NTTR, subsonic noise levels would increase a maximum of 3 dB. Sonic booms would increase by no more than 4 booms per month in one military operations areas and by no more than 2 booms per month in restricted areas. Supersonic activity would increase noise in some areas under the NTTR airspace authorized for supersonic flight by no more than 2 CDNL. There are no significant cumulative impacts from the interaction of the F-35 beddown and other past, present, and reasonably foreseeable actions.

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This Environmental Impact Statement (EIS) analyzes the potential environmental consequences resulting from the United States Air Force (Air Force) proposal to beddown (base) 36 F-35 fighter aircraft and to implement a Force Development Evaluation (FDE) program and a Weapons School (WS) at Nellis Air Force Base (AFB), Nevada. This Draft EIS was prepared by the Air Force, Headquarters Air Combat Command (HQ ACC) in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations implementing NEPA, and Title 32 of the Code of Federal Regulations (CFR) Part 989.

PURPOSE AND NEED FOR THE ACTION

The purpose of the proposed action is to implement the FDE program and WS for the F-35. The F-35 development and manufacturing process has been initiated and evaluation of the aircraft is currently taking place. F-35 aircraft will be placed in operational units and available for combat missions by Fiscal Year (FY) 2014. The goal of the Air Force is to field the most up-to-date aircraft with the most highly trained pilots through the lifecycle of a weapons system. This is achieved through the FDE program and the WS for the aircraft and pilots, respectively.

Force Development Evaluation Program. Throughout the lifecycle of an aircraft of perhaps 30 years or more, many changes occur to the aircraft itself and to the operating environment of the aircraft. These changes include new avionics hardware and software, tactics empirically developed in the field, changing threats and enemy capabilities, and new weaponry, just to name a few. The FDE program is needed to address these changes and keep the Air Force's inventory in the best possible position to combat enemy threats. FDE evaluates, demonstrates, exercises, and/or analyzes operational aircraft to determine their effectiveness and suitability. In addition, FDE identifies and resolves deficiencies during the sustainment portion of an aircraft's lifecycle.

Weapons School. The purpose of and need for the WS is to produce the Air Force's most highly trained weapons and tactics instructors. In turn, these highly trained instructors improve combat capability through superior training and instruction at the unit and base levels. WS graduates provide expertise in the tactical employment and operational planning and execution of integrated air and space power as required under AFI 11-415 *Weapons and Tactics Programs.*

Synergy Between FDE and WS. The FDE program and WS represent essential, but distinct parts of the Air Force's overall mission. These two essential parts of the F-35 program have different purposes, but the same needs. The types of flying activities required in each program are the same and the fundamental supporting assets (i.e., base, airspace) needed by both programs also closely match. Individually and combined, the FDE program and WS involve unique requirements that differ from those associated with the training activities of operational units. Both programs need specific, identical assets to meet their unique requirements.

PROPOSED ACTION AND NO-ACTION ALTERNATIVE

For the Air Force, ACC is responsible for implementing FDE and WS programs. These programs are best performed at a location that has infrastructure to support the full spectrum of testing and training activities. Nellis AFB, and its associated Nevada Test and Training Range (NTTR) and airspace represent the only ACC Major Range and Test Facility Base (MRTFB) that meets the unique requirements for the F-35 FDE program and WS. Other bases, like Edwards AFB, are MRTFBs, but none meet all the requirements for the FDE program and WS. These requirements include range instrumentation, threat simulation, support for large force training exercises, an integrated battle space environment, and suitable existing infrastructure. Moreover, the synergy between the FDE program and WS already established at Nellis AFB would not exist elsewhere. For this reason, as further discussed in Chapter 2, no other bases were identified as reasonable alternative locations for the F-35 FDE and WS.

The proposed action would involve the following.

- Base 36 F-35 aircraft at Nellis AFB with 12 aircraft for the FDE program and an additional 24 for WS training; as a phased program reliant on manufacturing progress and other elements of F-35 deployment, the first aircraft would arrive in 2012 and the last in 2022.
- Implement the F-35 FDE program at the base in 2012 and implement the WS in 2017.
- Construct, demolish, or modify a variety of base facilities to support the F-35 programs, particularly along the flightline.
- Conduct an additional 17,280 annual airfield operations at Nellis AFB by 2022, and an additional 51,840 annual sortie-operations in NTTR.
- Practice ordnance delivery on approved targets and release of chaff and flares in approved airspace.

Nellis AFB is the location of the Air Force's only existing fighter WS. Although the Air Force could replicate the WS at some other location, from the perspectives of economics, operations, and infrastructure requirements, basing the F-35 WS and FDE at Nellis AFB is the most reasonable option and makes sense. No other base, or combination of bases, offers the specific physical or organizational infrastructure necessary to support the unique requirements of the F-35 FDE and WS programs. Nellis AFB, its ranges, and airspace already exist and fulfill the F-35 testing and training program needs. Essentially, the F-35 is considered additive to the on-going Air Force fighter FDE and WS programs at Nellis AFB.

Under the no-action alternative, the F-35 FDE and WS beddown would not occur, and the Air Force would not implement associated construction or personnel increases at Nellis AFB. The FDE program and WS would not conduct operations at NTTR.

Scoping and Public Involvement

CEQ regulations require an early and open process for identifying significant issues related to a proposed action and for obtaining input from the public prior to making a decision that could potentially affect the environment. These regulations specify public involvement at various junctures in the development of an EIS, including public scoping prior to the preparation of a Draft EIS, and public review of the Draft EIS prior to finalizing the document and making a decision.

Prior to the publication of the Draft EIS, the Air Force issued a Notice of Intent (NOI) in the *Federal Register* on August 23, 2004. After public notification in newspapers and public service announcements on radio stations, five scoping meetings were held September 13 through September 17, 2004, at the following Nevada locations: Carson City, Alamo, Pioche, Pahrump, and Las Vegas. A total of 40 people attended the meetings and provided comments. By the end of the scoping period, October 1, 2004, nine comments and one agency letter were received.

Of the nine comments received from individuals during the scoping meetings, three citizens from Alamo expressed concern about sonic booms – the number, severity, potential for structure (i.e., window) damage, and human disturbance. One commentor asked if a restricted area could be created over the town. Two other areas of concern were how the F-35 would operate and the way in which it would fly within current airspace. In Las Vegas, one commentor asked if the F-35s would be used in the same way at the range (e.g., flights per day, how low, how fast) while another commentor expressed concerns about noise, radar interference, and safety for the residential areas to the east. A person in Pioche commented that during the Fall hunting season, deer appeared to be scared by early morning flights, in airspace over the central portion of NTTR. In Carson City, two attendees verbally (i.e., no written comments were received) expressed concern for potential low-altitude flight conflicts over areas being considered for wind generation development under the NTTR airspace.

A letter from the Nevada State Clearinghouse with comments from the State Historic Preservation Officer (SHPO) and Nevada Department of Wildlife was received during the scoping period. The SHPO indicated that once specific information is known about flight patterns and construction, it should be notified so that it can determine the potential for adverse impacts to religious, cultural, and historic properties. The Nevada Department of Wildlife expressed concern for: 1) a neotropical migrating bird, the Phainopepla (a state sensitive species that is found in mesquite/acacia plant communities); 2) the burrowing owl (both a federal and state sensitive species); and 3) the kit fox (a state species with conservation priority). No comments were received from the U.S. Fish and Wildlife Service (USFWS) or Bureau of Land Managment (BLM) during the scoping period.

Summary of Environmental Consequences

The analysis in this Draft EIS established that the proposed F-35 beddown would result in adverse effects on some resources such as air quality and noise, although none of these impacts would be significant to require additional mitigation. Moreover, for most resource categories, only minor or negligible effects would result. Table ES-1 summarizes the consequences for both the proposed action and the no-action alternative.

Table ES-1 Comparison of Alternatives by Resource and Potential Impact

Proposed Action	*No-Action Alternative*
AIRSPACE AND AIRCRAFT OPERATIONS	
Nellis AFB	
• Increase total Nellis AFB airfield operations by 20 percent • No change to airfield airspace structure or operational procedures; no impact to civil and commercial aviation airspace • No change in departure and arrival routes	• Average annual airfield operations remain at 85,000 • Existing departure and arrival routes remain unchanged
NTTR	
• No change to current special use airspace structure • F-35 would increase current total sortie-operations by 51,840 annually, for a total ranging from 251,840 to 351,840. This would represent a 26 percent increase under the 251,840 use scenario and a 17 percent increase under the 351,840 scenario. This increase would not exceed NTTR capability • A less than 1 percent increase in supersonic activities • No changes or increased need for supersonic-designated airspace • No impact to civil and commercial aviation	• MOAs and restricted areas unchanged • Continue to conduct 200,000 to 300,000 annual sortie-operations in NTTR • Maintain and use existing supersonic-designated airspace • Continued coordination with area Air Traffic Control to ensure safe airspace for all users

Table ES-1 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	***No-Action Alternative***
NOISE	
Nellis AFB	
• Beddown would generate a 85 percent increase (an additional 15,333 acres) in areas exposed to 65 DNL and greater by the year 2022 • Nellis AFB would continue noise abatement procedures to reduce overflights of residential areas and nighttime operations and run-ups • Noise complaints and annoyance levels in the Nellis AFB vicinity may increase • No adverse impacts to hearing and health would be anticipated	• Approximately 18,000 acres exposed to noise greater than 65 DNL • No change in existing noise abatement or safety procedures
NTTR	
• Subsonic noise would increase an average of 3 dB in 12 of the 21 airspace units under the 251,840 sortie-operations scenario and in 4 of the 21 airspace units under the 351,840 sortie-operations scenario • Supersonic noise would increase by 1 dB in the Reveille MOA and 2 dB in portions of R-4807 and R-4809 under the 251,840 scenario • Under the 351,840 scenario, supersonic noise would increase by 1 dB • Sonic booms would increase by 2 per month in R-4807 and by 1 per month in Desert and Reveille MOAs under the 251,840 scenario • Under the 351,840 scenario, booms would increase by 2 per month in almost all airspace units with the exception of the Elgin MOA where booms could increase by 4 per month • Noise complaints and annoyance levels may increase due to increased boom numbers • No adverse impacts to hearing and health	• Baseline subsonic noise levels would continue to range from less than 45 to 65 DNL for the 200,000 and 300,000 scenarios • Supersonic noise levels would continue to range from less than 45 to 57 CDNL under the 200,000 and 300,000 scenarios • Sonic booms range from 2 to 24 per month at 200,000 sortie-operations per year and 3 to 35 per month at 300,000 sortie-operations per year
AIR QUALITY	
Nellis AFB	
• Proposed construction, aircraft and equipment, and personnel vehicle commuting emissions would contribute less than 1 percent of all criteria pollutant emissions in any year; not exceeding to 10 percent threshold of regional significance • *De minimis* levels would be exceeded for CO, and NO_x; however, the Air Force is coordinating with Clark County's Department of Air Quality and Environmental Management to include the 185 tons of NO_x into their ozone State Implementation Plan (SIP) revision • CO exceedences are already covered in the Clark County CO SIP so these increases would not be adverse nor preclude the county from NAAQS attainment • No visibility impairments to PSD Class I areas	• Nellis AFB would continue to contribute less than 1 percent of all criteria pollutant emissions in Clark County

Table ES-1 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	***No-Action Alternative***
NTTR	
• Projected emissions would increase negligibly in Nye and Lincoln counties; this would not change the regional significance from baseline conditions • No impairment of visibility in PSD Class I areas would occur	• Nye and Lincoln Counties (airspace within Clark County is minimal) would continue in attainment for all criteria pollutants • Within Lincoln County, NTTR operations would continue to represent a regional contributor of less than 9.7 percent for any criteria pollutant • Within Nye County, NTTR operations will continue to represent a regional contributor of NO_x at 14.73 to 22.09 percent for the low- and high-use scenarios, respectively • No impairment of visibility due to NTTR activities would occur for PSD Class I areas
SAFETY	
Nellis AFB	
• No changes in safety due to operations and maintenance, fire and crash response, and munitions use and handling procedures • Additional munitions facilities and expansion of the live ordnance loading area would be constructed to support the increase in airfield operations; this would enhance safety • No anticipated increase to bird/wildlife-aircraft strike hazards or aircraft mishaps above baseline levels therefore, no impacts	• Operations and maintenance, fire and crash response, and munitions use and handling activities conducted on Nellis AFB would continue to be performed in accordance with applicable Air Force safety regulations • Mishaps would remain limited; in the last 5 years, there have been two Class A aircraft accidents on Nellis AFB, while over 340,000 airfield operations have been conducted • Bird/wildlife-aircraft strikes in the airfield environment would remain minimal; over a 14-year period there have been 233 bird strikes (occurring with over 1 million airfield operations), averaging about 17 per year
NTTR	
• All current fire risk management procedures would remain unaffected due to the F-35 beddown • Estimated time between Class A mishaps would remain low (2 to 45 years) with the increase in NTTR airspace use • Increase in use of flares (6 percent); could cause a negligible (<0.1 percent) increase risk of wildfires; however, existing fire response procedures would adequately address this minimal increase • No significant increase in bird/wildlife-aircraft strike hazards	• A total of approximately 4 to 5 fires, of less than 3 acres, occur annually on the ranges; this would continue • Estimated time between Class A mishaps within NTTR airspace ranges between 3 and 68 years under the 200,000 sortie-operations scenario and 2 and 45 years under the 300,000 sortie-operations scenario • Safety procedures for ordnance, chaff, and flare use would continue to be enforced to minimize risks • Probability of bird/wildlife-aircraft strikes would continue to be negligible; ten strikes have been reported over the past 10 years

Table ES-1 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	***No-Action Alternative***
LAND USE AND RECREATION	
Nellis AFB	
• Total acreage impacted by noise levels greater than 65 to 70 DNL would increase by 8 percent; however, no change to land status or management is anticipated • Noise levels exceeding 65 DNL could affect an additional 13,917 persons and continued incompatibility with residences would occur • 11 more sensitive receptors would be affected mostly within the 65 to 75 DNL contours • No impact to recreation	• Surrounding area would continue to include industrial, commercial, open, recreational, public, and residential land uses • Current noise levels exceeding 65 DNL affect about 50,950 people • 8,061 acres of residential lands surrounding the base are already zoned for noise levels above 65 DNL • 35 noise sensitive receptors would continue to be subject to noise levels of 65 DNL or greater
NTTR	
• No change to land status or land management • 3 dB or less change in subsonic noise and 1 dB or less change in supersonic noise levels over special use land management areas • Recreational areas underlying the Elgin MOA could experience an increase of 4 booms per month with the maximum sortie-operations (351,840) scenario; other areas might expect an increase of up to 2 booms per month • Aircraft emissions and overflights would not impair visual quality	• NTTR lands would continue being primarily managed by DoD, BLM, USFWS, and U.S. Forest Service • Special use land management areas would remain unchanged
SOCIOECONOMICS AND INFRASTRUCTURE	
Nellis AFB	
• Net increase of 412 active duty personnel at Nellis AFB by 2022 (3.4 percent increase over 2006) • Nearly $28.3 million in additional payroll disbursements with increased personnel • Adequate housing and utility supply; no adverse impact on area public schools • Increase in traffic during construction would be temporary and localized; should not adversely impact existing delays experienced by on-base traffic • No appreciable changes, to utilities ability to meet minor increases in demand	• No change in Nellis AFB active duty or civilian workforce which totaled 12,284 in 2006 • Total annual payroll expenditures in 2006 of more than $857 million • Housing and utility supply would remain unchanged; no change in public school enrollment • Delays at particular Nellis AFB intersections currently exist
ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN	
Nellis AFB	
• Noise levels of 65 DNL or greater would affect approximately 27,007 people belonging to minority groups and about 10,387 low-income populations (42 and 16 percent, respectively of the total affected population) • An additional 7 schools would be exposed to noise levels of 65 DNL or greater; however, safety risks to children would not increase	• Impacts to human health and environmental conditions in minority and low-income communities would remain unchanged • The number of schools currently affected by noise levels 65 DNL or greater would remain unchanged

Table ES-1 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	***No-Action Alternative***
SOILS AND WATER RESOURCES	
Nellis AFB	
• Approximately 36 acres would be disturbed over a 8-year construction period; most of the proposed construction would occur over previously developed land or replace existing buildings • Best management practices (e.g., erosion and dust controls) for construction would minimize the potential for erosion • No adverse effects to availability of surface water or groundwater; no additional water right required	• Nellis AFB would continue to implement standard construction and erosion control procedures to limit erosion for planned/approved construction projects • Existing water availability and use rates would continue to be adequate for base missions and personnel
BIOLOGICAL RESOURCES	
Nellis AFB	
• One federally-listed special status species (desert tortoise) found on Nellis AFB; the base would avoid this species and consult with USFWS as applicable • Of the two plant and four animal state-sensitive species known to occur on Nellis AFB, only the burrowing owl and the chuckwalla could be impacted. Nellis AFB would work with the Nevada Department of Wildlife to avoid impacts to these sensitive species	• The desert tortoise would not be affected; existing plans would continue to address management and protection of this species • The status of two plant and four animal state species of concern would not change
NTTR	
• Flare use would increase by 6 percent, but the risk of wildfire would remain minimal • Use of existing targets; therefore, no new ground disturbance on NTTR • No changes in existing impacts to the desert tortoise would be anticipated; implementation of the rules and procedures in management of this species would continue to minimize any potential impacts • Increases to subsonic (3 dB) and supersonic (1 dB) noise would not adversely impact wildlife	• The only federally-listed species occurring on the ranges is the desert tortoise within the South Range; implementation of existing rules and procedures in relation to this species would continue
CULTURAL RESOURCES	
Nellis AFB	
• Construction would avoid a National Register-eligible site in Area II • Cold War structure inventory is in progress but any potentially eligible sites would be avoided • No effect on traditional cultural resources	• No change to existing conditions • One National Register-eligible in Area II • No traditional cultural resources on base or in area immediately adjacent to the base
NTTR	
• Noise and sonic booms unlikely to affect archaeological sites or architectural resources • Increase of 1 to 4 sonic booms per month in the airspace units could be considered to affect setting of sacred and traditional use areas, but not adversely	• Existing conditions at 5,000 archaeological sites estimated beneath NTTR airspace would remain unchanged • Over 50 historic mining sites, rock art, traditional use areas, and sacred sites in NTTR would continue to be unchanged

Table ES-1 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	*No-Action Alternative*
HAZARDOUS MATERIALS AND WASTE	
Nellis AFB	
• No change in large quantity generator status • No change to existing management protocols required • Four potential F-35 construction sites may occur above ERP sites, an ERP waiver would be required prior to construction • No new types of hazardous materials would be introduced • F-35 maintenance would generate about 11,664 pounds of RCRA hazardous waste per year, approximately a 6 percent increase	• Nellis AFB would continue to be a large quantity generator • Existing procedures for renovation or demolition activities would continue to be reviewed by Civil Engineering personnel to ensure appropriate measures are taken to reduce potential exposure to, and release of, friable asbestos

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1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

Federal law and United States Air Force (Air Force) policy, as detailed below, require implementation of a Force Development Evaluation (FDE) program and Weapons School (WS) training for all new aircraft. To meet these requirements for the F-35, the Air Force proposes to base 12 F-35 aircraft for the FDE program and an additional 24 F-35 aircraft for WS training. As required by the National Environmental Policy Act (NEPA) and promulgated under the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] Part 1502.14[d]), this Environmental Impact Statement (EIS) analyzes the potential impacts of the beddown of the 36 F-35 aircraft and the implementation of the FDE program and WS at Nellis Air Force Base (AFB). This EIS also analyzes the no-action alternative to the proposed action.

The following section presents the purpose and need for the proposed F-35 beddown for the FDE program and WS. In this section, the Air Force presents the strategic, tactical, statutory, regulatory, and training basis for implementing the proposed action. It also describes the individual and synergistic importance of the FDE program and WS.

1.2 BACKGROUND FOR THE PURPOSE AND NEED

The Air Force strategy to modernize the aging inventory of aircraft with an almost all-stealth fighter force by 2025 began with the F-22[1] Raptor in the early 1990s. In 1994, the United States Congress and the Department of Defense (DoD) determined that the F-35 Joint Strike Fighter (JSF) would be developed to replace and supplement Air Force legacy fighter and attack aircraft (CRS 2004) consisting of the F-16 Fighting Falcon and A-10 Thunderbolt II.

Existing and anticipated foreign air defense systems have reached levels of effectiveness sufficient to pose a significant threat to current F-16 multi-role and A-10 air-to-ground aircraft. In addition, the

[1] In the first portion of the F-22 program, prior to operational beddowns, the Air Force designated the aircraft as an F-22. This designation correlated with the major role anticipated for the new aircraft—air superiority emphasizing air-to-air combat. In the NEPA documentation (Air Force 1999a) for the FDE program and WS beddown, the F-22 designator was used. Subsequent testing, development, and deployment resulted in further evolution of the aircraft's capabilities and missions, particularly air-to-ground operations. As such, the Air Force redesignated the aircraft as the F/A-22. The aircraft designation was the F/A-22 for a short time before being renamed F-22A in December 2005. Within this EIS, the Raptor will be termed the F-22A unless referencing specific documentation pre-dating that designation.

worldwide prevalence of sophisticated air-to-air and surface-to-air missiles continues to grow, increasing the number of threats to which the F-16 and A-10 are vulnerable. In 1993, the Joint Advance Strike Technology (JAST) program was established to define and develop a common joint strike fighter airframe that would fill multiple combat roles and meet the growing sophistication of enemy defense systems. The JSF common airframe is configured for Air Force conventional take-off and landings, Navy short take-offs and landings from aircraft carriers, and Marine Corps vertical take-offs and landings, and also addresses allied air forces operational needs.

1.2.1 F-16C and A-10 Aircraft Characteristics

The F-16C Fighting Falcon, a lightweight, single engine, multi-role tactical fighter configured for both air-to-air and air-to-ground operations, became operational in 1979. Equipped with a single M-61A1 20-millimeter (mm) multibarrel cannon, external stations for conventional air-to-air and air-to-surface munitions, and the capability to carry electronic countermeasure pods (Air Force 2005a), the F-16 represents one of the most effective multi-role aircraft in United States history. It has performed a wide range of missions, including air intercept, combat air patrol, conventional bombing, and close air support. For these reasons, the Air Force has used the F-16C heavily and successfully in combat since its inception. With a single seat for a pilot, the F-16C is powered by a single engine providing 27,000 pounds of thrust. The F-16C can fly 1,500 miles per hour (Mach 2.5) with a range of action that varies from about 675 to 860 nautical miles (nm).

First deployed in 1976, the A-10 Thunderbolt II became the first combat support aircraft. Originally designed for use against all ground targets including armored tanks, the A-10 has exhibited versatility, durability, and lethality over a variety of combat missions. The aircraft can fly low and slow, loiter extensively, and deliver massive munitions, including 30-mm rounds from a Gatling gun. Two turbofan engines provide 18,100 pounds of thrust (Air Force 2005b). Fully loaded, the A-10 can fly 420 miles per hour with a range of 695 nm.

1.2.2 F-35 Aircraft Characteristics

The Air Force designated the F-35 to replace and supplement existing, but aging F-16C and A-10 fleets, and to complement the F-22A. In that regard, these new aircraft would fulfill the wide range of roles and missions conducted by F-16s and A-10s. As such, the Air Force variant (i.e., conventional take-off and landing [CTOL]) of the F-35 embodies critical combat capabilities to fulfill multiple mission roles emphasizing air-to-ground missions. The F-35 epitomizes the characteristics needed for this role, offering a unique combination of capabilities.

- *Stealth*: Design features and radar-absorbent composite materials make the F-35 harder to detect than conventional aircraft of similar size.

- *Range and Supersonic Speed*: The F-35 offers an equivalent or greater combat radius than the F-16C while performing at substantially higher speeds than the A-10. The higher speeds and lower observability make Air Force pilots less vulnerable to enemy aircraft and ground-based threats.
- *Sensor Integration to Support Precision Munitions*: New F-35 computer systems, combined with an internal munitions bay, permit Air Force pilots to detect enemy threats and deliver precision munitions at substantially greater distances than supported by legacy aircraft.
- *Comprehensive Combat Information Systems*: Highly sophisticated avionics systems, including a helmet mounted display, are integrated throughout the F-35 to provide the pilot information from many sources and produce a clear, easily understood picture of the combat situation.
- *Low Maintenance Costs:* Computerized self-tests of all systems, improved stealth maintenance, and other autonomic logistics information system components form features designed to enhance the reliability and mission-readiness of the F-35.

The F-35, a single-seat, all weather fighter, receives its power from one F135 Pratt and Whitney jet engine capable of supplying approximately 35,000 pounds of thrust and speed up to of Mach 1.5. Capable of employing air-to-ground, air-to-air, and guided weapons from an internal weapons bay, the F-35 also offers a 25-mm cannon for close air support and anti-armor missions. It also employs defensive countermeasures such as chaff and flares, although its stealth characteristics would likely reduce the need for such measures.

1.2.3 F-35 Development and Deployment Process

To fulfill these roles, the Air Force must prepare F-35 aircrews to accomplish its missions. In preparation, the F-35 weapons system must be fully tested, tactics must be developed and documented, and this information must be taught to pilots and support personnel. The Air Force uses a standard process for weapons system acquisition, production, testing, and deployment. Several steps occur during the process:

- Statement of Operational Need
- Congressional Funding
- Concept Demonstration
- Systems Development and Demonstration
- Production
- Acceptance Testing
- Initial Operational Testing and Evaluation
- Force Development Evaluation
- Weapons School
- Future Beddowns of Operational Units

Through the systematic process outlined above, the Air Force must ensure that:

1. the F-35 receives thorough, intensive testing and evaluation to ensure its effective, safe operation;
2. the FDE program and WS continues to refine the capabilities of the F-35 and improve tactics employed in the F-35 for as long as the aircraft remains part of the Air Force inventory; and
3. environmental documentation, developed in accordance with NEPA, the Clean Air Act, and all other applicable regulations have been or will be prepared for each major action within the process, including future beddowns of operational F-35s.

The requirement that led to the F-35 was identified through the process described in Air Force Instruction (AFI) 10-601, *Mission Needs and Operational Requirements Guidance and Procedures*. During the 1980s, the Air Force assessed its tactical capabilities against projected threats and determined that a multi-role aircraft deficiency would emerge in the foreseeable future. Such a deficiency could jeopardize the United States' ability to ensure that its forces have the freedom of action to conduct operations against opposing forces. In 1993, the DoD created the JAST program to conduct a major tactical aviation review. The JAST determined that the JSF would best meet the long-term mission needs of Air Force, Navy, Marine, and allied air forces. This joint service project determined a need to produce the JSF aircraft in three variants: conventional take-off and landing (Air Force), carrier based (Navy), and a short take-off and vertical landing version (Marine Corps) to meet existing and future operational missions (CRS 2004). Fiscal legislation from Congress in 1995 supported F-35 development and manufacture. Beginning in 1996, concept demonstration began and demonstrator aircraft flew in 2000 and 2001. These satisfactory results initiated the systems development and demonstration phase.

Since 2001, the F-35 program has been progressing through the Operational Test and Evaluation (OT&E) phase. The Air Force plans to begin the F-35 FDE program by fiscal year 2012 (FY12) with FDE activities supporting the FY14 initial operational capabilities (IOC). The overall F-35 OT&E would ensure that the F-35 meets mandatory operational capabilities. The FDE program lasts as long as the aircraft remains in the Air Force inventory, repeatedly testing and evaluating the aircraft and its systems to ensure continued fulfillment of operational requirements. FDE also explores the use of new flight techniques and tactics for aircraft performance, supporting pilot development and training programs. By testing capabilities of an aircraft in tactical situations, including air-to-ground and air-to-air and electronic combat operations, FDE provides unique input on tactics to the WS and operational units.

The WS represents an essential activity also performed throughout the life of the aircraft in the Air Force inventory. As established in Multi-Command Regulation 55-120, the WS conducts graduate-level instructor courses in weapons and tactics employment. The WS offers academic courses and flight training on specific aircraft to qualified instructor pilots. Upon completion of WS courses, which include 2 weeks of combat training exercises, graduate officers return to their home units to provide advanced instruction to unit pilots on employing the aircraft for its mission. As currently planned under the proposed action, F-35 WS graduates from Nellis AFB would return to operational squadrons in FY17.

By FY10, Air Education and Training Command would receive F-35 aircraft to establish pilot training and begin qualifying pilots. To accomplish this training, Air Education and Training Command would first establish a training squadron. Members of this squadron would complete F-35 pilot training and successfully perform the academic work and demonstrate the flying skills necessary to achieve instructor status. Some of these new instructor pilots would be assigned to operational units planned to receive F-35s. Some would also become WS instructors. By FY14, a sufficient number of qualified instructor pilots would be ready to receive the advanced training of the WS.

The ultimate goal of the F-35 development and deployment process is to provide Air Force operational units with a proven, tested aircraft, as well as tactics and operational guidance to meet mission requirements. The Air Force will prepare appropriate environmental analyses for any future F-35 beddowns for training and operational units.

1.3 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to implement the F-35 FDE program and WS for the F-35. The F-35 development and manufacturing process has been initiated and evaluation of the aircraft is currently taking place. F-35 aircraft will be placed in operational units and available for combat missions by FY14.

The goal of the Air Force is to field the most up-to-date aircraft with the most highly trained pilots through the lifecycle of the weapons system. This is achieved through the FDE program and the WS for the aircraft and pilots, respectively.

1.3.1 Force Development Evaluation Program

Throughout the lifecycle of an aircraft, perhaps 30 years or more, many changes occur to the aircraft itself and to the operating environment of the aircraft. These changes include new avionics hardware and software, tactics empirically developed in the field, changing threats and enemy capabilities, and new weaponry. The FDE program is needed to address these changes and keep the Air Force's inventory in the best possible position to combat enemy threats. FDE evaluates, demonstrates, exercises, and/or analyzes field operational aircraft to determine its effectiveness and suitability. In addition, FDE identifies and resolves deficiencies during the sustainment portion of an aircraft's lifecycle.

In accordance with Title 10, Section 2399 of the United States Code (U.S.C.), the DoD and the Air Force must test major weapon systems prior to any major defense acquisition. In addition, AFI 99-102, *Operational Test and Evaluation* (Section 2.1), directs that "OT&E (of which FDE is a part) will be conducted in as realistic an operational environment as possible and practicable, and identify and help resolve deficiencies as early as possible. These conditions must be representative of both combat stress and peacetime operational conditions." The AFI defines the needed elements of FDE and explains how the Air Force major command operating the aircraft plans and conducts FDE until the aircraft is retired.

For the F-35, Air Combat Command (ACC) is the major command responsible for implementing the Air Force FDE program. The FDE program fulfills several important functions:

- refines employment doctrine and tactics in response to changing threats;
- develops or refines operational procedures and training programs;
- evaluates changes to the F-35 aircraft to repair newly identified deficiencies and verifies they have been corrected throughout the entire time the aircraft is in the Air Force inventory;
- explores tactical means of meeting changing operational requirements as long as the aircraft remains in the inventory;
- evaluates operational flight programs, other software changes, pre-planned product improvements, modifications, upgrades, mission data updates, and other improvements or changes as long as the F-35 is in the inventory;
- researches, demonstrates, exercises, analyzes, and evaluates tactics against anticipated threats; and
- ensures proper aircraft performance in combat by providing training, information on operational capabilities, and new requirements.

1.3.2 Weapons School

The purpose of and need for the WS is to produce the Air Force's most highly trained weapons and tactics instructors. In turn, these highly trained instructors improve combat capability through superior training and instruction at the unit and base levels. WS graduates provide expertise in the tactical employment and operational planning and execution of integrated air and space power as required under AFI 11-415 *Weapons and Tactics Programs*.

Under AFI 11-415, ACC must establish and maintain a WS for each aircraft type in its inventory. This program operates throughout the life of the aircraft, adapting to changes in technology, tactics, and threats. Feedback to and from the FDE program is essential to the WS since it applies, evaluates, and refines tactics developed under FDE. The WS provides up-to-date training for pilots already qualified to fly the aircraft. With tactics and combat training as its focus, the WS offers rigorous, intensive, and realistic instruction that enables WS graduates to effectively teach combat skills to members of their home operational units. The WS:

- provides graduate-level training for weapons and tactics for the F-35 aircraft;
- prepares graduates to instruct other pilots in the most up-to-date tactics and capabilities, thereby readying operational F-35 units with combat missions for potential enemy threats; and
- includes intensive combat training exercises offering the realism needed to test and hone the skills and knowledge of the graduates.

1.3.3 Synergy Between Force Development Evaluation and Weapons School

The FDE program and WS represent essential but distinct parts of the Air Force's overall mission. These two essential parts of the F-35 program have different purposes but the same needs. The types of flying activities required in each program are the same and the fundamental supporting assets (i.e., base, airspace) needed by both programs are also closely matched.

Individually and combined, the FDE program and WS involve unique requirements that differ from those associated with the training activities of operational units. Both programs need specific, identical assets to meet their unique requirements. For the F-35, these fall into three major categories.

- *Airspace and Ranges*. The F-35 FDE program and WS each need military airspace, secure training ranges, and associated ground facilities capable of accommodating specific operational and training activities. Such activities are very similar for both FDE and WS; only their purpose differs between the two programs.
- *Professional Expertise and Opportunities for Realistic Operations*. Basing of the F-35 must provide personnel with the opportunity to perform realistic operations and the training needed to realize the full value of the FDE and WS programs.
- *Base*. A base for FDE and WS must offer the physical and organizational infrastructure to support these programs.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Air Force proposal to implement the F-35 FDE program and WS at Nellis AFB, including operational changes and construction. As required under the CEQ (40 CFR Part 1502.14(d)), it also describes the no-action alternative, in which the F-35 FDE program and WS would not be implemented. The chapter also evaluates the process and criteria used to define the location of the F-35 beddown. As a result of this evaluation and application of FDE and WS basing criteria, the Air Force determined that Nellis AFB comprised the only reasonable location for the proposed action.

The Air Force proposes to base 36 F-35 aircraft at Nellis AFB: 12 for the FDE program and an additional 24 F-35 aircraft for WS training. Under this beddown proposal, the F-35 would supplement and eventually replace the aging F-16 FDE program and WS and A-10 aircraft at Nellis AFB. As a phased program reliant on manufacturing progress and other elements of F-35 deployment, the first F-35 would arrive in 2012 and the last in 2022. This proposal would also involve adding to the existing inventory of aircraft; construction, demolition, and/or modification of base facilities; and implementation of flight activities for the FDE program and WS within Nevada Test and Training Range (NTTR). No net changes in overall airspace configuration is anticipated with the F-35 beddown. The details of the proposed action form the basis for analysis of potential environmental impacts. Assessment of the F-35 capabilities and missions reveals that Nellis AFB represents the single location that reasonably provides for the specific and unique requirements of the F-35 FDE program and WS.

2.1 BASING REQUIREMENTS FOR F-35 FDE PROGRAM AND WS

2.1.1 Test and Training Missions

The basis for testing and training derives from the combat missions expected and planned for an aircraft. Table 2-1 outlines the representative test and training mission activities derived from F-16 and A-10 missions that would be applied to the F-35. It also presents data on the types of airspace generally used for each activity.

Table 2-1 Projected FDE Program and WS Test and Training Activities Required for the F-35

Activity	*Tasks*	*Airspace Type*
Aircraft Handling Characteristics	G-force awareness, maneuverability, break turns, high angle of attack maneuvering, acceleration maneuvering gun tracking, offensive and defensive positioning, simulated fueling, stall recovery	MOA* and ATCAA**
Basic Fighter Maneuvers	Recognize all offensive/defensive weapons situations, defeat enemy weapons employment, G-force awareness, offensive/defensive maneuvering, visual missile defense, beyond visual defense, maneuvering for weapons use, defensive countermeasures (chaff and flares) use	MOA and ATCAA
Surface Attack Tactics	2 vs. 4, or 4 vs. 4 aircraft, low to high altitude tactical weapons delivery and escape maneuvers (day and night)	MOA, Restricted Areas (over weapons delivery ranges)
Air Combat Maneuvers	Multi-aircraft formations and tactics, systems check, G-force awareness, 2 vs. 4 and 4 vs. 6 aircraft intercepts, combat air patrol, defense of airspace sector from composite force attack, intercept and destroy bomber aircraft, avoid adversary fighters	MOA , Restricted Areas
Low Altitude Training	1 or 2 aircraft offensive and defensive operations at low altitude, G-force awareness at low altitude, handling, turns, tactical formations, navigation, threat awareness, defensive response, defensive counter measure (chaff/flares) use, low to high and high to low altitude intercepts, missile defense, combat air patrol against low/medium altitude adversaries	MOA, Restricted Areas
Tactical Intercepts	2 vs. 4 and 4 vs. 6 tactical intercepts, G-force awareness, electronic countermeasures, lead and formation flying	MOA, Restricted Areas, and ATCAA
Night Operations	4 vs. 4 aircraft intercepts and defense, defensive countermeasure (chaff/flare) use, maneuvering for weapons use	MOA, Restricted Areas, and ATCAA
Dissimilar Air Combat Tactics	Multi-aircraft and multi-adversary (involving dozens of aircraft) defense and combat air patrol, defense of airspace sector from composite force attack, intercept and destroy bomber aircraft, avoid adversary fighters, strike-force rendezvous and protection	MOA, Restricted Areas, and ATCAA
Mission Employment	Multi-aircraft and multi-adversary (involving dozens of aircraft) composite strike force exercise (day and night), systems check, air refueling, strike force defense and escort, air intercepts, electronic countermeasures, combat air patrol, defense against composite force, bomber intercepts, defensive countermeasure (chaff/flare) use	MOA, Restricted Areas, and ATCAA
Ordnance Delivery	Single to multiple aircraft attacking a wide range of ground-targets using different ingress and egress methods, delivery tactics, ordnance types, angles of attack, and combat scenarios	Restricted Airspace (over weapons delivery ranges) MOA

Source: AFI 11-2F-16, AFI 11-2F-22
* MOA– military operations area
** ATCAA– air traffic control assigned airspace

2.1.2 Overall Considerations

Several considerations must be applied when selecting the base to support the specific F-35 FDE program and WS needs. These considerations, as described below, are important both in supporting the FDE program and WS, as well as for defining the type of location needed for the beddown.

1. ***Integrated Battlespace for Testing and Training.*** An integrated battlespace environment for testing and training consists of airspace, range, and other assets that support the full spectrum of operations that could be encountered in combat. Such an environment supports realistic activities, including major exercises involving many types of aircraft in addition to aircraft adopting the roles and tactics of adversaries. An integrated battlespace environment also offers a variety and arrangement of ground-based threats that require aircrews to operate and react as they would in combat. It provides air-to-air and air-to-ground testing and training, employing the equipment and facilities to monitor and review aircraft and aircrew performance. Since the F-35 FDE program and WS must test and train under as realistic conditions as feasible, a nearby location offering an integrated battlespace environment is required.

2. ***Interaction of F-35 FDE Program and WS.*** Interaction between the staffs of the FDE program and WS enhances the professional expertise of each program. FDE staff tests and evaluates the operational capabilities of an aircraft and uses this information to develop tactics. These capabilities and tactics are then incorporated into the WS program. The WS staff also evaluates the utility and value of the tactics through its intensive training course, providing feedback to the FDE staff on changes and refinements in tactics. This feedback process forms a continuous improvement cycle, or synergy, between the two programs as long as the aircraft remain in the Air Force inventory. Locating both programs at the same base would enhance the synergy, allowing consistent interaction between the F-35 FDE program and WS.

3. ***Maximize Use of Existing Infrastructure to Accommodate the F-35 FDE Program and WS.*** A base that requires minimal changes to accommodate these F-35 programs would offer a more efficient and effective alternative than a site that needed extensive changes and/or improvements. Such efficiency and effectiveness can be measured in terms of costs. For example, fewer infrastructure improvements and personnel changes would translate into lower overall costs. Similarly, minimized changes may also equate to less potential for environmental impacts; fewer infrastructure changes mean less construction and ground disturbance that could affect the environment.

4. ***Support the Functional and Operational Characteristics of the F-35.*** The functional and operational characteristics designed into the F-35 emphasize an air-to-ground combat role but also recognize the F-35's ability to perform air-to-air missions. These characteristics consist of

maneuverability, stealth, comprehensive yet simple combat information systems, as well as maintainability, sustainability, reliability, and responsiveness. The F-35 aircraft will possess many of the functional and operational characteristics of the F-16 and A-10 aircraft, allowing it to fulfill their missions effectively and efficiently. Table 2-2 outlines the characteristics and associated operational requirements for F-35 test and evaluation.

Table 2-2 F-35 Operational Characteristics and Requirements

Operational Characteristics	*Operational Requirements*
Agility and Maneuverability	• Adequate airspace in which to employ the full spectrum of combat tactics • Engage ground-based and adversary aircraft threats employing combat tactics • Operate in a wide range of modes for air-to-ground missions (e.g., interdiction, armor, close air support) against a variety of target types
Range and Supersonic Speed	• Provide airspace capable of supporting the multi-role missions including restricted areas over targets • Sufficient airspace in which to fly supersonic during tactics employment • Simulate enemy capabilities and tactics by engaging adversary aircraft
Stealth	• Ability to safely test and use stealth in tactics that minimize conflicts with commercial and civil aviation • Employ simulated adversary instrumentation and threat radar in operations
Comprehensive Combat Information Systems	• Opportunity to employ systems in large force exercises involving numerous and different aircraft types • Use ground-based simulated threats and instrumentation to test information systems in combat tactics
Maintainability, Sustainability, Reliability, and Responsiveness	• Adequate facilities to employ large force, multi-day exercises simulating combat operations tempo • Employ full spectrum of tactics and capabilities to evaluate aircraft systems
Weapons and Defensive Capability	• Ability to employ full range of air-to-ground ordnance against spectrum of target types expected in combat • Use defensive countermeasures (i.e., chaff and flares) in combat tactics

2.1.3 Criteria for Basing F-35 FDE Program and WS

Using these overall considerations and also considering the combat role of the F-35 aircraft, the Air Force applied nine criteria as basing requirements for the F-35 FDE program and WS.

1. ***ACC and Major Range and Test Facility Base (MRTFB).*** Under Air Force policy and instructions, implementation of the FDE program and WS is the responsibility of the major command operating the new aircraft. ACC is the Air Force's primary fighter command and is the major command receiving the F-35s, so ACC is responsible for the F-35 FDE program and WS, as well as eventual deployment of the aircraft to the Air Force operational units. To ensure it meets its responsibilities, ACC must maintain command and control over these programs throughout their existence. In addition, FDE activities occur on an MRTFB as described in DoD 32-00.11. Basing the F-35 FDE program and WS at an ACC base designated as a MRTFB would aid in fulfilling these responsibilities because of the special funding authorities and assets associated with such bases. A location suitable for the F-35 WS must not only share many of the same attributes characteristic of an MRTFB but also offer a training range capable of supporting full-scale exercises and instrumentation for comprehensive scoring and debriefing.

2. ***Runway Length.*** Due to the expected operational parameters for the F-35 under the FDE program and WS, an 8,000 foot-long runway that includes an arresting cable would be required.

3. ***Ramp Space.*** The FDE program and WS, when fully established, would require a total of 36 F-35 aircraft to meet the requirements of testing and tactics development, as well as providing for graduate-level combat training of instructor pilots. Therefore, a base must provide sufficient ramp space to park 36 F-35s for the FDE program and WS, or it must permit safe expansion of ramp space.

4. ***Security Restrictions.*** Because the F-35 represents the newest and most sophisticated strike fighter aircraft in the world, knowledge of its systems and capabilities would provide a potential advantage to adversaries. For this reason, the ability to observe specific FDE program and WS operations must be restricted. Both the base for the F-35 beddown and a large proportion of the ground underlying the airspace associated with the base must prohibit unauthorized observation of these aircraft operations.

5. ***Airspace.*** The F-35 FDE program and WS need a large airspace area that overlies land containing air-to-ground targets, restricted areas for training and testing, and authorized airspace for supersonic flight activities. To provide sufficient airspace for combat maneuvering by F-35 aircraft, the base must have nearby military operations areas (MOAs), restricted airspace, or a combination of both over land, measuring at least 100 by 50 nautical miles (nm). This area

should offer sufficient airspace for an F-35 to identify an adversary aircraft, lock-on with a weapons system, and close with the opposing aircraft. Due to the increasing capabilities of non-U.S. advanced fighters and air-to-air missiles, airspace offering 100-nm separation between opposing aircraft should be considered a minimum. This size of airspace also provides for maneuvering associated with air-to-ground missions. The airspace must also permit substantial vertical maneuvering, offering altitudes from surface or near surface to 50,000 feet mean sea level (MSL) or higher. Since the upper altitudes of MOAs generally stop at 18,000 feet MSL, the airspace also needs to include air traffic control assigned airspace (ATCAA) above the MOAs to accommodate the training requirements.

6. ***Ordnance Use and Ranges.*** Under an FDE program and WS, the functionality of all systems, including ordnance delivery systems, requires evaluation and use under tactical conditions. Since the F-35 will perform air-to-ground missions an estimated 65 percent of the time, the availability of a full spectrum of air-to-ground training assets represents an essential criterion. To fully evaluate and use these systems, the FDE program and WS must conduct test and training activities at a tactical range that permits delivery of training (inert or nonexplosive) and live (explosive) ordnance using myriad techniques and tactics. Aircraft and weapons performance must also be monitored from the point of release to the point of impact. For the F-35 FDE program and WS, a range must be available that provides full scoring feedback systems for weapons use. Under the F-35 primary mission, it is expected to carry the Joint Direct Attack Munitions (JDAM) as well as other ordnance used by existing aircraft in the Air Force inventory. A range that would also support the F-35 air-to-air mission forms another requirement for basing.

7. ***Range Instrumentation System***. A significant proportion of F-35 FDE program and WS activities would involve employing and evaluating the full range of maneuvers that would be used in combat. These activities, in part, test the capabilities of the aircraft and pilot in realistic combat training situations. To provide the realism needed for these activities, the F-35 must engage in combat training with other aircraft and against adversary aircraft. A range instrumentation system; therefore, must provide for live monitoring and recording of these flight activities. Instructors and pilots can then review the training actions and use this feedback to improve performance and tactics. Testing and training regularly involve dozens of aircraft, so the base and airspace supporting the F-35 FDE program and WS must offer an instrumentation system capable of simultaneously monitoring and recording multiple aircraft within the ranges.

8. ***Realistic Threats.*** An important element of the F-35's value to the Air Force stems from its expected capability to avoid and defeat the variety of ground-based surface-to-air missile and anti-aircraft-artillery systems maintained by potential enemies of the United States. To ensure and refine that capability and the tactics used in its employment, the F-35 FDE program and WS need to operate against simulated ground-based threats that provide the variability and realism

expected in actual combat. Therefore, the F-35 should operate in airspace that overlies an array of realistic, flexible electronic emitters that simulate the types of enemy radar anticipated in a variety of combat scenarios. In combating these threats, the F-35 must use its full capabilities, including defensive countermeasures. As such, any location for the F-35 beddown needs to offer training areas authorized for chaff and flares use.

9. ***Training Exercises.*** The FDE program and WS contribute to pilot readiness in order to successfully perform combat missions. To augment the synergy needed for the FDE program and WS, the F-35 must engage in realistic combat training with other "friendly" aircraft and against adversary aircraft. To achieve this type of training, a base must offer an organizational structure and mission, as well as access to airspace and other interrelated training assets that promote interaction of the F-35 with a variety of other aircraft through major exercises.

2.1.4 Identification of Basing Location for F-35 FDE Program and WS

To meet the specific and unique requirements of the F-35 FDE program and WS, a location must satisfy the overall considerations as well as fulfill each basing criteria. Support of both test and training missions along with the required facilities and infrastructure form essential factors defining whether a base can meet the purpose and need for this proposed action. As described below, the Air Force considered the attributes of the 65 major active Air Force bases in the United States relative to the requirements. Only one location, Nellis AFB and the associated NTTR, meets these requirements.

Applying Overall Considerations to Nellis AFB

1. ***Integrated Battlespace Environment for Testing and Training.*** NTTR exceeds the basing requirements, offering one of the best sets of facilities, ranges, infrastructure, and airspace to provide an integrated battlespace environment.

2. ***Interaction of the F-35 FDE Program and WS.*** Nellis AFB offers the unique opportunity for interaction between the F-35 FDE program and WS. The Air Force needs to test and evaluate the operational characteristics of the F-35 aircraft through the FDE program. The WS staff needs to incorporate the results of tactics developed through test and evaluation into the WS curriculum so that state-of-the-art tactics and techniques can be taught to the pilots from operational F-35 squadrons located throughout the world. F-35 tactics developed by the FDE program would be used in a wide range of simulated combat conditions by these students and instructors. As threats change through time, tactics would require consistent re-evaluation and refinement by the FDE staff. Co-locating the FDE program and WS at the same facility would create a continuous tactics improvement cycle. It would permit FDE and WS pilots to interact daily, exchanging information, and acquiring knowledge through face-to-face briefings/debriefings. Nellis AFB has

been and remains the Air Force's only location for both the fighter aircraft FDE program and WS. This personnel interaction between the FDE program and the WS at Nellis AFB has existed for many years and currently supports other aircraft (e.g., F-22As, F-16s, A-10s, etc.). This interaction, or synergy, has proven invaluable to developing the full combat potential of the aircraft and the aircrews. In addition, Nellis AFB offers command and control of the 505th Wing, providing a single command structure. Synergy is further enhanced because both the F-35 FDE program and WS fall under the direct command of the United States Air Force Warfare Center (USAFWC).

3. ***Maximize Use of Existing Infrastructure.*** Basing the F-35 FDE program and WS at Nellis AFB would require little change to its existing infrastructure. To accommodate the specific organizational and operational requirements of these two F-35 programs, no changes would need to occur in Nellis AFB's organization or structure, its associated ranges or airspace, its security measures, range instrumentation and threat simulators, or major force exercises. Nellis AFB has already developed and upgraded many general infrastructure requirements with the F-22A beddown. Only on-base construction and facility upgrades would be needed for the F-35. The FDE program and WS could be directly integrated into the long-established testing and training activities that form part of the daily routine for the base.

Applying Basing Criteria to Nellis AFB

These basing criteria, as well as the F-35 operational characteristics and requirements flying and mission considerations listed in Section 2.1.2, are addressed below.

1. ***ACC Major Range and Test Facility Base.*** As an ACC base and a MRTFB, Nellis AFB and NTTR meet this criterion. Of the 16 Army, Navy, Air Force, and DoD MRTFBs designated by the DoD's Operational Test and Evaluation Division, NTTR represents such a facility under ACC command and control. There already exists a Test and Evaluation Squadron and Weapons School at Nellis AFB to receive the F-35s and incorporate them into their missions without duplication of personnel and resources. In addition to its status as an MRTFB, NTTR comprises a fully capable training range hosting many multi-force exercises annually.

2. ***Runway Length.*** Nellis AFB includes two runways, each measuring more than 10,000 feet in length and exceeding the 8,000-foot criterion for the F-35 FDE program and WS. There are also arresting cables to meet this criterion.

3. ***Ramp Space.*** Nellis AFB can accommodate over 140 aircraft on its ramps at the same time. While current and near future inventories of aircraft at the base remain at 113, the combination of

aircraft from large force exercises and the F-35 beddown creates the need for some additional ramp space. Nellis AFB has safe and secure areas to accommodate this needed ramp expansion.

4. ***Security Restrictions.*** Nellis AFB offers standard, high-level Air Force security, particularly along the flightline and ramp areas. No unauthorized individuals may enter the base, and security forces guard all entry points and the base boundary. The base currently houses highly-protected aircraft like the F-22A. NTTR offers close to 3 million acres of land restricted from public entry and is patrolled and/or monitored by security forces.

5. ***Airspace.*** Airspace comprising NTTR lies within 20 nm of Nellis AFB. It includes MOAs and restricted areas that cover approximately 150 by 80 nm and contiguous airspace that exceed the 100 by 50 nm criterion. All of this airspace overlies land, with roughly one-half extending from the surface to unlimited altitudes and the other half extending from 100 feet above ground level (AGL) to 60,000 feet MSL or higher (including ATCAA). Varied terrain, including mountains and expanses of flat desert, underlie this airspace. All NTTR airspace supports supersonic flight, although at differing altitudes, with portions authorized for flights as low as 100 feet AGL (in a restricted area only) and as high as 60,000 feet MSL. With these attributes, the NTTR airspace associated with Nellis AFB meets the specific criteria for basing the F-35 FDE program and WS.

6. ***Ordnance Use and Ranges.*** NTTR, managed and operated by Nellis AFB, meets this basing criterion. It includes more than 2,000 targets within 195 target complexes. A total of 81 target complexes permit ordnance delivery with live (explosive) weapons ranging from 5.56-caliber rounds to 2,000-pound bombs or heavier. Tactical targets within NTTR also permit use of inert (non-explosive) training ordnance. Almost every type of conventional (i.e., non-nuclear) air-to-ground ordnance is authorized for use on NTTR. Several subranges and target complexes within NTTR provide monitoring and scoring for ordnance delivery and provide real-time scoring feedback to pilots. Therefore, NTTR meets this criterion of providing full instrumentation for F-35 weapons deployment.

7. ***Range Instrumentation System.*** NTTR provides extensive live monitoring, recording, and tracking instrumentation to support the full range of F-35 testing and training maneuvers. Using the Nellis Air Combat Tracking System (NACTS), the Range Control Center at Nellis AFB can track and monitor a single aircraft's entire mission or a multi-aircraft exercise. NACTS replaced the former Air Combat Maneuvering Instrumentation (ACMI) tracking and uses a system of aircraft transmitters and ground receivers which allow recording of all flight maneuvers for later replay and flight debriefings. The range instrumentation system available from Nellis AFB provides coverage for the NTTR airspace, offering real-time coverage or air-to-air and surface-to-air operations. For these reasons, only NTTR and Nellis AFB meet this basing criterion.

8. ***Realistic Threats.*** NTTR offers sufficient threat realism and simulated threats to meet the basing criteria for the F-35 FDE program and WS. NTTR includes multiple electronic threat simulators and communications jamming equipment that defend 195 target complexes containing more than 2,000 simulated targets. These established electronic threats are used to train and test aircrews and weapons systems in a realistic battlespace environment. These threats simulate the full range of anticipated enemy air defenses, including radar units for target acquisition, surface-to-air missiles, and anti-aircraft artillery. This substantial array of equipment provides realistic threats for both testing and training operations. NTTR also permits the use of defensive countermeasures in response to these realistic threats. Chaff and flares can be employed throughout most the NTTR airspace.

9. ***Training Exercises.*** Nellis AFB, along with NTTR, represents the Air Force's premier location to conduct complex, multi-aircraft combat training exercises. Nellis AFB conducts multiple large force exercises every year. These large force training exercises realistically simulate aircrew deployment, actual battlefield combat, and the intense tempo of air warfare. The FDE program and WS aircraft also participate in these exercises. In terms of the F-35, the opportunity to participate in these Nellis AFB programs would fulfill the basing requirement defined above.

2.1.5 Alternatives Considered But Not Carried Forward

In compliance with NEPA, as promulgated under CEQ regulations 40 CFR Part 1502.14, the Air Force must consider reasonable alternatives to the proposed action. The CEQ notes, however, that if a very large number of alternatives potentially exist, an agency must only analyze a reasonable number of examples. Determining what constitutes a reasonable range of alternatives depends on the nature of the proposal and the facts in each case. The CEQ regulations require a brief discussion of the reasons for eliminating alternatives not considered reasonable (40 CFR 1502.14). Furthermore, the AFI implementing NEPA (promulgated at 32 CFR 989.8(b)) defines "reasonable" alternatives as those that meet the underlying purpose and need for the proposed action and that would require a reasonable person to inquire further before choosing a particular course of action. To narrow the number of alternatives, the AFI allows eliminating alternatives from detailed analysis based on reasonable selection standards (e.g., operational, technical, or environmental standards suitable for a particular project). For this proposal, Sections 2.1.3 and 2.1.4 presented above address the selection standards. The following discussion briefly explains the reasons for eliminating alternatives from detailed study.

The purpose of the action discussed in this EIS is to implement both the F-35 FDE program and WS. To achieve that purpose, the Air Force must implement the FDE program and WS at a base that meets the specific and unique requirements of each program. Although many bases are capable of accommodating F-35 operational units, the FDE program and WS have requirements different from those needed for the operational units.

The F-35 FDE program and WS are best located at an ACC base to ensure command and control and to support ACC in meeting its responsibilities for the overall F-35 development and deployment process. This location would also be a MRTFB. Of the 65 bases within the Air Force, only one represents an ACC MRTFB installation: Nellis AFB, Nevada. Other bases, such as Edwards AFB, California, have an MRTFB, but are not under direct ACC command and control or do not meet other basing criteria.

DoD, the Air Force, and ACC also operate many bases and training ranges such as Goldwater Range, Arizona, McGregor Range New Mexico, and others. These other installations and ranges serve important functions to the DoD and, at some point, could support operational F-35s conducting training suited for their particular mission. However, these other bases and ranges currently have existing missions of critical need for the DoD and the Air Force. Addition of the F-35 FDE program and WS, along with the associated infrastructure and operations, would interfere with the primary missions of those bases and ranges.

For example, Edwards AFB, and its Air Force Flight Test Center, serves as the primary location for flight testing new aircraft in their initial or developmental stages. The base offers infrastructure to support many individual types of test aircraft. Airspace and ranges associated with or nearby the base provide the assets and instrumentation needed for the specific type of aircraft testing performed at Edwards AFB. Although an important test center for the Air Force, Edwards AFB does not meet the specific and unique requirements for either the F-35 FDE program or the WS. It does not meet the overall considerations presented for these F-35 programs (refer to Section 2.1.2), since it does not offer an integrated battlespace environment. Placement of the F-35 programs at Edwards AFB would require major changes to base and training range infrastructure. Of the nine basing criteria listed in Section 2.1.3, Edwards AFB and associated assets fail to meet five. It is not an ACC base (criterion 1), it lacks the range instrumentation (criterion 7) and realistic threat environment (criterion 8) essential to the FDE program and WS, and it offers neither the ordnance delivery ranges (criterion 6) nor support for large-force training exercises (criterion 9).

Holloman AFB serves as another example of a vital base that would be inappropriate for the F-35 FDE program and WS. Holloman AFB primarily supports operational and training units of F-117A, T-38A, and Tornado (German Air Force) aircraft and will be obtaining the F-22 to replace the F-117A (Air Force 2006e). This base is organized and structured for these operational and training units, not for FDE program and WS. While supporting components of an MRTFB, it conducts only testing on the nearby White Sands Missile Range which emphasizes ground-based engineering, as well as radar, missile, and aircraft testing.

While it represents a DoD center of excellence for these capabilities and supports diverse operational units, Holloman AFB does not meet the specific and unique requirements for the F-35 FDE program and WS. At a minimum, it does not meet the considerations and criteria enumerated in Section 2.1.2 and

2.1.3 because it lacks the following elements: integrated battlespace environment (consideration 1), existing infrastructure for an FDE program (consideration 3), range instrumentation for tracking and providing feedback to numerous aircraft simultaneously (criterion 7), threat simulation for a realistic battlespace environment (criterion 5), and support for large-force training exercises involving a broad spectrum of aircraft and situations (criterion 9).

Of the 16 MRTFBs, only Nellis AFB and NTTR meet all F-35 FDE program and WS considerations and criteria. As noted above, Holloman AFB is an ACC base with an associated MRTFB. However, it fails to fulfill the criteria for basing the F-35 FDE program and WS. The other MRTFBs similarly lack the attributes required for basing (Table 2-3). Eight of the sixteen bases are controlled by the Army or Navy, not under the command of the Air Force. The remaining eight Air Force MRTFBs either do not meet the considerations presented in Section 2.1.2 or the criteria applied in Section 2.1.3. In addition, each would require far more changes to establish the F-35 FDE program and WS than would be needed at Nellis AFB and NTTR.

It is not possible to exactly quantify the costs to duplicate the existing infrastructure, airspace, and personnel for the FDE program and WS at an installation other than Nellis AFB and NTTR. Multiple actions would be needed at Edwards AFB and nearby training ranges to duplicate the FDE program and WS capabilities found at Nellis AFB. Similar changes would be needed to alter other bases to duplicate the capabilities at Nellis AFB and NTTR. A conservative list of these actions includes: enhanced electronic threats and targets; range instrumentation with tracking, scoring, and related teaching facilities; additional security and airspace modifications; and new or relocated personnel to perform comprehensive FDE program and WS functions. Also, extensive construction would be needed at Edwards AFB or other bases, resulting in additional costs of millions of dollars to duplicate the FDE program and WS capabilities currently available at Nellis AFB and NTTR.

Establishing the F-35 FDE program or WS at a base other than Nellis AFB or at a range other than NTTR might be possible, but it would not represent a reasonable alternative. Other bases would need to make changes to their infrastructure, organization, existing programs, and probably, reconfigure/create new airspace and ranges in order to meet the specific requirements of an F-35 FDE program and WS. Such changes would conflict with the overall basing consideration regarding minimizing change by employing existing assets. To provide the integrated battlespace environment and level of training exercises important to the FDE program and WS, the Air Force would need to make wholesale changes to the ranges and the exercises held there. Basing the F-35 FDE program and WS at a base other than Nellis AFB would require changes to that base, its organization, and its associated ranges and airspace. This would:

- require additional time to establish the FDE program and WS, further delaying the entire F-35 program and potentially diminishing national defense capabilities;

- substantially increase the costs of implementing the F-35 program beyond that allocated by Congress and approved by the President; and
- likely result in more extensive actions that could have effects on the environment greater than those potentially occurring from the proposed action.

The Air Force considered the possibility that the FDE could be established at a different base than the WS, and the Air Force considered that possibility. But splitting the FDE program and the WS between two locations would not be an efficient or effective use of existing available infrastructure, training assets, and personnel. Economies of maintenance, training, and personnel would be achieved by establishing both the F-35 FDE program and F-35 WS at the same base and using the same airspace to conduct needed flight operations. Further economies would accrue if a base selected for the F-35 FDE program and WS already supported such programs for other fighter aircraft. Separating the two programs at different bases would not achieve these economies and would represent an inefficient use of available resources.

Establishing the FDE and WS at two separate locations would also reduce the opportunity for the two programs to provide feedback to one another about the capabilities of the F-35 and the expansion of those capabilities for combat. Transitioning specific F-35 airframes from FDE to WS would be simpler if both programs resided at the same base. After considering the concept to duplicate the F-35 FDE program and WS at different bases, and the factors described above, the Air Force determined it would not be reasonable to separate the programs.

In summary, splitting the FDE program and WS between bases would not fulfill the basing criteria. It would eliminate the synergy achieved when both reside at a single base, and subsequently increase the costs and resources involved. This increase in cost and lengthening of the timeline to implement the beddown could delay the entire program, potentially diminishing national defense capabilities.

No location or combination of locations other than Nellis AFB would meet the specific requirements for basing the F-35 FDE program and WS. No reasonable action alternative to Nellis AFB exists, because none would fulfill the purpose and need for the proposal.

2.1.6 Alternatives Carried Forward for Analysis

As noted above, the Air Force and ACC's only existing fighter FDE program and WS are currently located at Nellis AFB, so it represents the location of the proposed action. Nellis AFB, its ranges, and its airspace provide the only basing location that meets the needs for both the F-35 FDE and WS programs. Therefore, two alternatives were carried forward for detailed analysis in this EIS, the no-action alternative and the proposed beddown of the F-35 at Nellis AFB. The no-action alternative is detailed in Section 2.2 and a description of the proposed action follows in Section 2.3.

2.2 NO-ACTION ALTERNATIVE

CEQ regulations (40 CFR Part 1502.14(d)) that implement NEPA require analysis of a no-action alternative. "No action" means that the proposed action (i.e., F-35 beddown at Nellis AFB) would not take place, and the resulting environmental effects from taking no action would be compared to the effects of implementing the proposed action. Under the no-action alternative for this EIS, no F-35 FDE program and WS beddown would occur at Nellis AFB and no on-base construction or personnel increases would be implemented, and the F-35 FDE program and WS would not use NTTR. The following descriptions of the current status of Nellis AFB and NTTR provide a context for comparing the changes that would occur with the proposed action.

2.2.1 Nellis AFB

The base, located in the southeast corner of the state of Nevada, lies adjacent to the city of North Las Vegas (Figure 2-1). Nellis AFB is the center for ACC training and testing activities conducted at NTTR, with the base providing logistical and organizational support for NTTR, the aircraft training, and personnel. Situated in Clark County, the base lies 5 miles northeast of the City of Las Vegas. The unincorporated town of Sunrise Manor and undeveloped portions of Clark County surround the majority of the base, although open space dominates to the northeast. Covering 14,161 acres, the base contains three major functional areas (Figure 2-2). Area I, the main base, is located east of Las Vegas Boulevard and includes the airfield and most base functions. Area II, the Munitions Storage Area (MSA)/Weapons Storage Area (WSA) lies northeast of the main base, Area III, located northwest of the main base, includes a number of facilities such as a hospital, storage, and housing. The areas north and east of Nellis AFB are primarily open range and mountains, with commercial and industrial uses along Las Vegas Boulevard. Directly south and southwest of the base, commercial and residential land uses mixed with some industrial activities dominate the area.

The mission of Nellis AFB is to provide realistic combat training involving every type of aircraft in the Air Force inventory. It also supports test and evaluation programs and weapons schools for all Air Force fighter aircraft: A-10s, F-15C/Ds, F-15Es, F-16s, and F-22As. The organizational structure of Nellis AFB includes four major wings and 60 other units. The USAFWC, headquartered at Nellis AFB, consists of four wings: three wings—the 57th Wing (57 WG), the 98th Range Wing (98 RANW), and the 99th Air Base Wing (99 ABW)—are based at Nellis AFB. The fourth, the 53rd Wing (53 WG), operates from Eglin AFB, Florida, although some of its units, like the 422nd Test and Evaluation Squadron, are at Nellis AFB. Table 2-3 summarizes the major units and their functions. In addition, Nellis AFB and NTTR host and conduct large-force exercises for U.S. and allied air forces.

Figure 2-1 Nellis AFB and NTTR Location Map

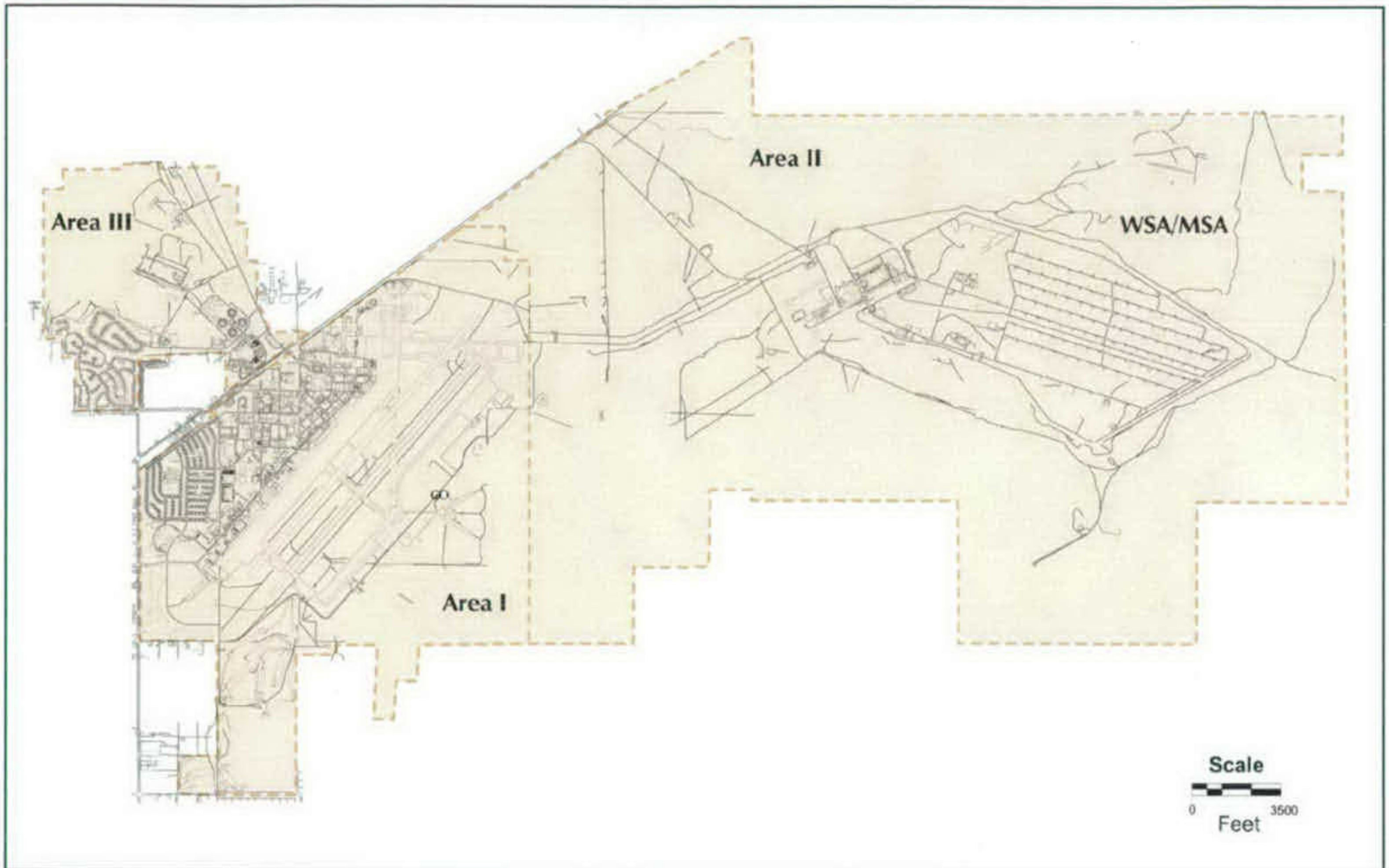


Figure 2-2 Nellis AFB Functional Areas

Table 2-3 Nellis AFB Units Relevant to the Proposed Action	
Unit	***Relevant Functions***
USAFWC	• Manages all advanced pilot training and integrates test and evaluation requirements. • Oversees flying operations at Nellis AFB: 57 WG, 98 RANW, and the 53 WG.
57th Wing Weapons School 414th Combat Training Squadron (Red Flag)	• Oversees all flying operations at Nellis AFB including the Weapons School and 414th Combat Training Squadron. • Manages airspace. • Ensures realistic training in combined air, ground, and electronic threat environment. • Provides an advanced combat training course in weapons and tactics. • Trains graduate-level fighter aircrews for all fighter aircraft. • Conducts large-force exercises involving combat training for multiple "friendly" and "adversary" forces.
53rd Wing 422nd Test and Evaluation Squadron	• Based at Eglin AFB except for the 422nd Test and Evaluation Squadron. • Responsible for operational testing and evaluation of new equipment and systems proposed for use by the forces. • Develops new tactics for aircraft in the Air Force inventory. • Operates A-10, F-15C, F-15E, F-16C, F-22A, and HH-60G aircraft.
98th Range Wing	• Operates, maintains, and develops NTTR comprising about 3 million acres of land and 12,000 square nm of airspace. • Operates airfields at Creech AFB and the Tonopah Test Range.
99th Air Base Wing	• Host wing for Nellis AFB. • Oversees all day-to-day operations and functions of the base.

The 414th Combat Training Squadron conducts large-force exercises that maximize the combat readiness and survivability of participants by providing a realistic training environment. Red Flag is a special multi-week large force exercise that realistically simulates aircrew deployment and combat situations. Red Flags are complex, full-scale simulated wars, complete with aggressor aircraft using adversary tactics. These exercises teach units how to deploy and operate in an integrated manner. In a typical Red Flag exercise, Blue Forces (friendly) engage Red Forces (aggressor) in combat situations. Blue Forces are made up of units from ACC, Air Mobility Command, U.S. Air Forces Europe, Pacific Air Forces, Air National Guard, U.S. Air Force Reserve, Army, Navy, Marine Corps, and allied air forces. They are led by a Blue Forces commander who orchestrates the employment plan. Red Forces are composed of Red Flag's Adversary Tactics Division and provide the threats through the emulation of enemy tactics. In a typical year, the Air Force plans three to five Red Flag exercises at Nellis AFB and NTTR.

Nellis AFB Assigned Aircraft and Airfield Operations

Under the no-action alternative, the number and nature of aircraft assigned to Nellis AFB and the quantity and type of airfield operations would remain unchanged from the baseline conditions described below. Table 2-4 lists the aircraft force structure currently stationed at Nellis AFB. Since Nellis AFB supports major force exercises such as Red Flag, more than a dozen types of transient (visitors not based at Nellis AFB) aircraft temporarily operate from the base during exercises. These aircraft range from American B-1B bombers to fighters such as the Mirage 2000 and Tornado, operated by U.S. allies. Table 2-5 summarizes the principal operational tasks of the major types of aircraft that are stationed at Nellis AFB, use the base as transients, or operate within NTTR. Other aircraft at Nellis AFB are minor transient users and are not listed.

Table 2-4 Aircraft Assigned to Nellis AFB

Aircraft Type	*HH-60*[1]	*A-10*	*F-15C*	*F-15E*	*F-16*[2]	*F-22A*[3]	*Total*
Number of Aircraft	11	10	19	11	45	17	113

[1] Helicopter
[2] Includes FDE/WS (26); Thunderbird Demonstration Team (8); and Aggressors Squadron (11)
[3] Includes all F-22A aircraft authorized for basing at Nellis AFB
Source: Air Force 2004a

Table 2-5 Major Types of Aircraft Operating at Nellis AFB and in NTTR

Aircraft Type	*Status*	*Description*
A-10 and OA-10 Thunderbolt II	B/T	Low altitude, heavily protected aircraft designed to defeat armored vehicles and act as forward air controller
AV-8B Harrier	T	Close support attack aircraft used by the Marine Corps; has short takeoff and vertical landing capabilities
B-1B Lancer	T	Long range, high and low altitude bomber performing deep interdiction strikes
B-2 Spirit	T	Long range, high and low altitude bomber performing deep interdiction strikes with stealth technology
B-52H Stratofortress	T	Long range, high and low altitude bomber performing deep interdiction strikes
C-130 Hercules	T	Four-engine turboprop troop and cargo transport
C-17A Globemaster	T	Long range, heavy lift cargo transport
E-3 Sentry	T	Airborne Warning and Control System (AWACS) capable of high- or low-level surveillance of air vehicles over all types of terrain
E-8C Joint STARS	T	Multi-engine aircraft modified with a side-looking radar for ground surveillance, targeting, and battle management missions
EA-6B Prowler	T	Navy all weather, electronic warfare aircraft capable of detecting, locating, jamming, and destroying enemy air defense radar; now employed by the Air Force to replace the EF-111
F/A-18C/D Hornet	T	U.S. Navy, Marine Corps, and Canadian Air Force twin-engine, multi-mission tactical air-to-air and air-to-ground fighter aircraft
F-15C Eagle	B/T	Performs air-to-air combat and air intercept operations; no surface attack missions
F-15E Strike Eagle	B/T	Air-to-ground fighter with air-to-air capability
F-16C/D Fighting Falcon	B/T	Multi-role fighter performing close air support, air-to-air combat, interdiction strikes, and suppression of enemy air defenses
F-117A Night Hawk	T	Light bomber with stealth technology

Table 2-5 Major Types of Aircraft Operating at Nellis AFB and in NTTR (con't)		
Aircraft Type	***Status***	***Description***
F-22A Raptor	B	Air-to-air combat and intercept missions and air-to-ground missions with stealth technology
HH-60G Pave Hawk	B	Combat search and rescue helicopter designed for long range, rapid response missions
KC-135R, KC-10A	T	High-altitude aerial refueling aircraft to support varied aircraft missions
Mirage 2000	T	High performance delta-winged fighter/bomber used by foreign air forces
Unmanned Aerial Systems (UAS)	B*	UAS providing long endurance, unmanned aerial reconnaissance, surveillance, and target acquisition
RC-135 Rivet Joint	T	Surveillance aircraft equipped with sophisticated intelligence gathering devices for monitoring enemy electronic activity
Tornado	T	Supersonic swing-wing interceptor, attack, and reconnaissance aircraft used by air forces of the United Kingdom, Italy, Germany, and Saudi Arabia

Notes: B = Based, T = Transient for exercises, B*= Based at Creech AFB

The Nellis AFB airfield airspace environment comprises part of the Class B airspace that the Federal Aviation Administration (FAA) designates around the nation's busiest airports. Designed for air traffic operating under instrument flight rules, Class B airspace for Nellis AFB extends around Nellis AFB and Las Vegas' McCarran Airport. Class B airspace requires that all aircraft operating within the area be in contact with the controlling air traffic control facility. Nellis AFB operates two parallel runways extending northeast-southwest (refer to Area I, Figure 2-1). Section 3.2 provides more information regarding Class B airspace and operations.

This document uses three terms to describe different aircraft flying activities: *sortie, airfield operation,* and *sortie-operation*. Each has a distinct meaning and commonly applies to a specific set of activities in particular airspace units. A *sortie* consists of a single military aircraft from takeoff through landing. For this EIS, the term sortie is commonly used when summarizing an amount of flight activity from Nellis AFB. In contrast, an *airfield operation* represents the single movement or individual portion of a flight in the base airfield airspace environment such as one takeoff, one landing, or one transit of the airport traffic area. A single sortie generates at least two airfield operations (takeoff and landing), and a sortie can result in more than one *sortie-operation* at NTTR. A *sortie-operation* comprises the use of one airspace unit (e.g., MOA, Restricted Area) within NTTR by one aircraft. Sortie-operation applies to flight activities outside the airfield airspace environment. Each time a single aircraft conducting a sortie flies in a different airspace unit, one sortie-operation is counted for that unit.

From 1987 through 1994, annual airfield operations at Nellis AFB have varied between 61,000 and 181,000 (Air Force 1999b) as a result of budget constraints, aircraft realignments, and changes in the number, composition, and duration of the exercises conducted at Nellis AFB. In 2003 aircraft conducted approximately 86,000 airfield operations (Air Force 2004e). For these same reasons, Table 2-6 presents the baseline annual airfield operations at Nellis AFB according to based versus transient aircraft and day or night operations.

Table 2-6 Annual Airfield Operations at Nellis AFB

Aircraft Type	*Annual Airfield Operations*		*Total*
	Day (7:00 a.m. - 10:00 pm)	*Night (10:00 p.m. - 7:00 a.m.)*	
Aircraft Based at Nellis AFB[1]	56,401	6,073	62,474
Transient Aircraft	23,155	0	23,155
Total	**79,556**	**6,073**	**85,629**

Source: Air Force 2004e
[1] Includes authorized F-22A operations

Facilities and Infrastructure

Nellis AFB includes a well-developed infrastructure supporting a broad spectrum of functions and organizations. Covering 14,161 acres, the base consists of three functional areas (refer to Section 2.2.1 and Figure 2-2). There are more than 2,000 buildings in the Nellis AFB inventory. Area I, the main base, occupies about 30 percent of the base and contains runways, flightline, industrial facilities, housing, and administrative and support facilities. Area II, supporting the MSA/WSA, Rapid Engineers Deployable Heavy Operational Repair Squadron Engineer (REDHORSE) Reserve Squadron, and Munitions Squadron, covers approximately 59 percent of the base. Area III covers about 11 percent of the base and includes Manch Manor housing, the hospital, temporary lodging facilities, Family Camp, and an industrial area. Under the no-action alternative, no change to this existing infrastructure would occur.

Personnel

No increase of personnel would occur under the no-action alternative. Estimated personnel levels at Nellis AFB would remain unchanged from the present, as shown in Table 2-7. However, Nellis AFB is a vital and active installation constantly changing and refining missions and organizations. This dynamism results in fluctuations of personnel levels within a year and year-to-year. Variations of a few hundred personnel occur consistently, and Nellis AFB absorbs and adjusts to them.

Table 2-7 Nellis AFB Personnel

	Military	*Civilian and Contract Employees*	*Total*
Nellis AFB Personnel	8,615	3,669	12,284

Source: (Air Force 2006a)

2.2.2 Nevada Test and Training Range

The NTTR refers to the land withdrawn for the range and its associated military training airspace. The NTTR airspace covers approximately 12,000 square nm. Two airfields, Creech AFB and Tonopah Test Range, lie within NTTR and support the activities performed within the complex. In addition, the range includes the Tolicha Peak Electronic Combat Range.

In 1999, a Legislative EIS was prepared to renew the NTTR land withdrawal. Public Law 106-65, the Military Lands Withdrawal Act of 1999, extended the land withdrawal until 2021 and supersedes any former land withdrawals (Air Force 1999b). NTTR withdrawn land consists of two main functional areas, the North Range and South Range, both of which accommodate the delivery of live and inert ordnance as well as electronic combat operations (Figure 2-3). The North Range contains four unmanned weapons delivery complexes and multiple and dispersed facilities supporting three Electronic Combat Ranges: Tonopah Electronic Combat Range, Tolicha Peak Electronic Combat Range, and Electronic Combat South Range. These ranges provide a spectrum of high-to-low electronic threat environments.

The South Range contains five weapons delivery areas consisting of two manned weapons delivery complexes and three unmanned complexes. The South Range overlaps a portion of the Desert National Wildlife Range (DNWR), an area established in 1936 for the protection and preservation of desert bighorn sheep. Through mutual and collaborative efforts, the Air Force and the U.S. Fish and Wildlife Service (USFWS) work to maintain proper management of the DNWR land areas that coincide with NTTR.

To improve target complex realism, NTTR enhances targets with actual or simulated military assets including a tank battlefront, truck convoys, airfields, industrial complexes, surface-to-air missile sites, and a railroad complete with marshaling yards and defends many of these target complexes by electronic threat simulators providing a realistic arena for operational testing of weapons systems, tactics, and combat readiness. Threat simulators mirror electronically and, in many cases, visually resemble equipment likely to be encountered in actual combat. Radar units simulate early warning, ground control intercept, target acquisition, and surface-to-air and anti-aircraft artillery defenses and guidance.

NTTR ground equipment includes multiple radar and communications jamming equipment designed to test and improve the quality of aircrew combat training. Many of the threat simulators also support instruments to collect data useful in evaluating and scoring surface-to-air engagements.

The Air Force deploys extensive monitoring and tracking equipment throughout NTTR to support testing and training. Data collected on the range and in the associated airspace are processed by computers located in the Range Control Center at Nellis AFB which can track a multi-force engagement (up to 100 aircraft simultaneously) or a single aircraft's entire mission.

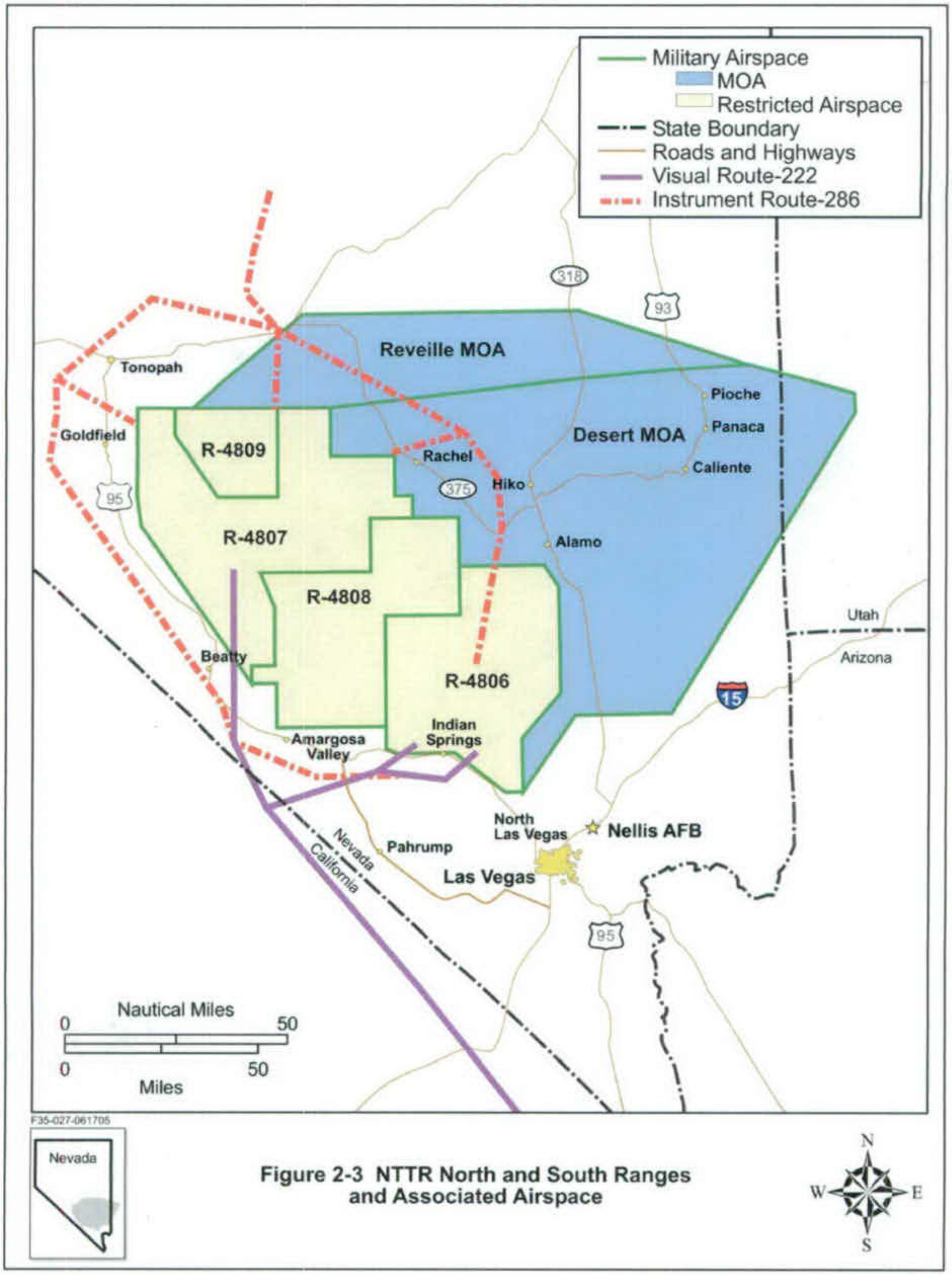


Figure 2-3 NTTR North and South Ranges and Associated Airspace

NTTR supports realistic training by permitting the use of ordnance, both live and inert. Aircrews must be skilled in the use of the full range of conventional Air Force weapons, from unguided ordnance and laser-guided bombs to air-to-ground missiles. NTTR provides for safe training, testing, and evaluation of weapons systems in support of potential technological improvements in hardware, software, tactics, and training. In recent years, the total amount of ordnance used annually on NTTR has varied, with a high of 4,500 tons and a low of 3,000 tons (Air Force 1999b). Inert (i.e., non-explosive) ordnance represents slightly more than 50 percent of the ordnance expended on NTTR. Since ordnance use does not directly correlate to the number of sortie-operations flown in NTTR, the amount of ordnance tends to vary year-to-year and would continue to do so under the no-action alternative. NTTR provides the capability to use an extensive inventory of conventional live and inert training ordnance including a wide range of air-to-ground weapons: so-called "iron" (unguided) bombs, cluster bombs, rockets, cannon, and guided bombs and missiles.

Inert training ordnance includes no high explosives and commonly consists of a small steel projectile or steel-encased concrete projectile. Constructed to function like actual munitions, inert ordnance vary in weight from about 10 pounds to 2,000 pounds. Some inert ordnance contain a small spotting charge that generates a puff of smoke to aid in scoring weapons delivery. Live ordnance, as the designation indicates, includes high explosive charges. Live ordnance used in training and testing at NTTR is identical to that used in actual combat. Live ordnance includes cluster bomb units to general purpose bombs weighing 2,000 pounds and containing almost 1,200 pounds of high explosive. Air-to-ground missiles (AGM), such as the AGM-65 Maverick (300-pound explosive warhead) and 2.75 inch rockets are also used on authorized targets at NTTR. While air-to-air missile training occurs at the range, safety rules require the missiles remain fixed to the aircraft. No actual launching of air-to-air missiles is permitted over NTTR.

Public protection is ensured at NTTR by excluding the public and non-required military personnel from locations simulating an active, high-stress battlefield environment. Air Force control of NTTR enables flight and ground operations to train and test equipment for the defense of national security interests while minimizing risks to the public. The Air Force uses Operational Risk Management for making decisions that promote safe operations. These management procedures produce standards to protect the public, military personnel, and equipment from ordnance impacts.

All firing or release of weapons must be conducted in a manner that ensures impact within the assigned hazard area. For air-to-ground missiles and free-fall guided weapons, the land area and airspace must be large enough to contain the entire flight envelope of the weapon from launch/release to impact. Weapons safety buffers are developed for all aircraft, weapons, and delivery systems employed in training/testing. Safety buffers for all weapons encompass the target area and several miles on either side of the target. As the largest exclusive-use, land-based range in the continental United States, NTTR can accommodate existing and projected future weapons safety buffers.

Electronic threat emitters are deployed throughout the range. Some established threat systems are mobile to decrease redundancy and aircrews becoming accustomed to these emitter sites. Ground-launched simulated threats, such as simulated Smokey surface-to-air missiles (SAMs) are also placed on the range.

Isolation of hazardous materials and dangerous operations from the public and untrained military personnel provides the greatest safety margin at NTTR. Each weapon system is evaluated for hazards associated with operations, maintenance, and military capability. Operational rules, regulations, and practices minimize the chance of personnel injuries.

Airspace Structure

NTTR includes restricted airspace that overlies the military lands and is adjacent to the MOA airspace. The restricted areas comprise special use airspace within which the FAA has determined that potentially hazardous activities occur, including air-to-ground ordnance delivery. Regulations prohibit nonparticipating military and civil/commercial aircraft from flying within this airspace without authorization. Training activities within NTTR predominantly involve subsonic flight but supersonic flight is authorized in all NTTR airspace units, although at differing altitudes (Table 2-8 and Figure 2-4). Under the no-action alternative, the structure, function, and use of NTTR would not change. Variation in the amount of use would likely occur, but it would remain within the range of variability noted over the past decade or more.

Table 2-8 Charted Airspace Associated with NTTR

Airspace Unit	*Floor (lower) Altitude*	*Ceiling (upper) Altitude*	*Supersonic Flight Authorized*
Reveille MOA	100 feet AGL	17,999 feet MSL	Above 5,000 feet AGL
Desert MOA	100 feet AGL	17,999 feet MSL	Portions above 5,000 feet AGL and rest of the MOA above 30,000 feet MSL
Restricted Area R-4806	100 feet AGL	Unlimited	West side above 5,000 feet AGL and rest of area above 30,000 feet MSL
Restricted Area R-4807	Surface	Unlimited	Portions above 100 feet AGL; portions above 5,000 feet AGL; and rest of area above 30,000 feet MSL
Restricted Area R-4809	Surface	Unlimited	Above 5,000 feet AGL, with authorization
Restricted Area R-4808[1]	Surface	Unlimited	Above 14,000 feet MSL

[1] Department of Energy (DOE) airspace over the Nevada Test Site (NTS); it is not part of NTTR but its western portion is used by NTTR aircraft to transit to and from the North Range.

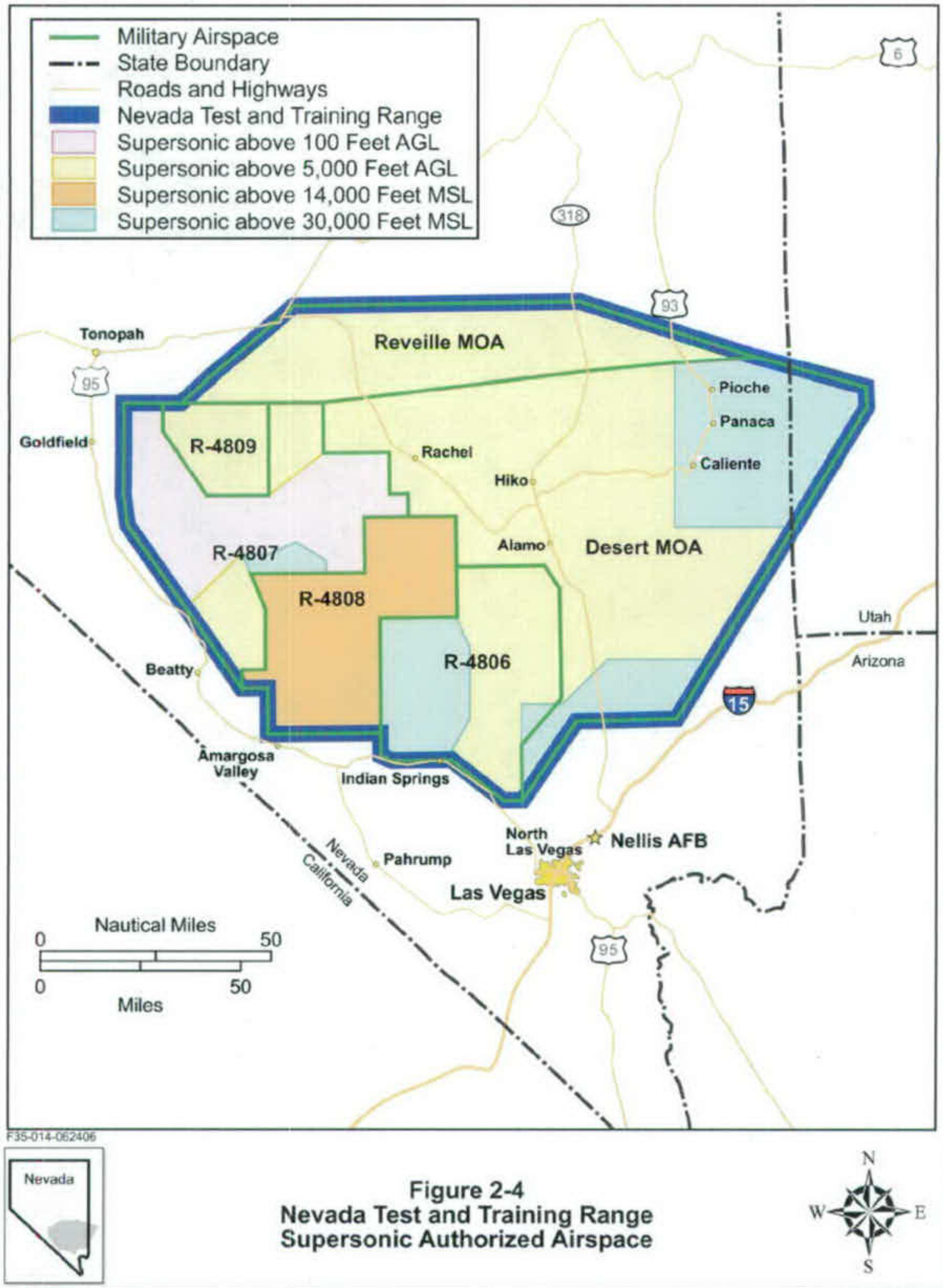


Figure 2-4
Nevada Test and Training Range
Supersonic Authorized Airspace

The NTTR airspace consists of Restricted Areas R-4806, R-4807, R-4808, and R-4809 and the Desert and Reveille MOAs with overlying ATCAA. The Tonopah Test Range underlies a portion of Restricted Area R-4809. R-4808 lies adjacent to the NTTR airspace and is controlled by the DOE for NTS activities. Through joint management with the DOE, and a cooperative and collaborative scheduling process, NTTR aircraft can transit this restricted airspace for entering and exiting NTTR North Range. Currently, NTTR and DOE are coordinating changes to the management and use of R-4808 to ensure continuation of R-4808 for its intended purpose and protection of surrounding airspace uses.

MOAs associated with NTTR include Reveille and Desert. MOAs consist of special use airspace that provide substantial vertical and horizontal maneuvering room for military aircraft training, and separate that training from other air traffic. MOAs also identify areas where concentrated military aircraft operations may occur. When a MOA is active, the FAA normally routes instrument flight rules traffic around it. In contrast, nonparticipating military and civil aircraft operating under visual flight rules may enter an active MOA by employing see-and-avoid procedures.

ATCAA overlies both MOAs, extending from 18,000 feet MSL to an altitude assigned by the FAA. ATCAA provides additional maneuvering airspace for training, and the FAA assigns it on an as-needed basis. Since federal rulings limit the ceiling of MOAs to altitudes up to, but not including 18,000 feet MSL, an ATCAA provides additional airspace from 18,000 feet MSL to whatever higher altitudes are needed to accommodate the flight training requirements. ATCAAs are only activated for use while scheduled aircraft operations are being conducted within the higher altitudes above the MOAs.

Authorized Supersonic Flight Areas

Because air combat requires varied speeds as a tactic, the NTTR airspace offers the opportunity to conduct supersonic flight. All NTTR airspace units (to some extent) are authorized for supersonic flight activities, including the Desert and Reveille MOAs overlying ATCAA (refer to Figure 2-3). Within authorized airspace, supersonic flight activities primarily occur during air-to-air combat and to a lesser degree during evasive maneuvers in response to ground threats or adversary aircraft. Not all aircraft using NTTR conduct supersonic flight. For aircraft capable of supersonic speed, supersonic flight occurs between 3 and 10 percent of the time during air-to-air combat on a typical training flight. The F-16, the aircraft most similar to the F-35 in terms of function and structure (i.e., single engine), conducts supersonic flight about 10 percent of the time during air-to-air combat.

NTTR and Associated Airspace Use

More than 20 different types of aircraft conduct testing or training within NTTR (refer to Table 2-5). Aircraft stationed at Nellis AFB, such as F-15s, F-16s, and F-22As form the predominant aircraft using the complex. Aircraft from other services (e.g., Navy F/A-18s) and U.S. allies also conduct operations in

NTTR. The capabilities available at NTTR are in extremely high demand. Annually, the Air Force expends over 45 percent of its total training ordnance at NTTR for testing tactics and training missions. With an average of three to five major exercises planned each year, NTTR represents a major training asset, ensuring aircrew and aircraft readiness. For example, most of the U.S. and some of the Coalition aircrews received their first "combat" missions at NTTR's simulated battlespace before fighting in the most recent conflicts in Afghanistan and Iraq.

Annual military use of NTTR varies, depending on many factors. These factors include Congressional funding levels, weapons testing requirements, aircrew training requirements, scheduling conflicts, deployments, and the actions of potential enemies that may pose a threat to the security interests of the United States or our allies. Due to these year-to-year variations in use, and the expectation that they will continue, the Air Force previously conducted a comprehensive review of NTTR aircraft sortie-operations (Air Force 1999b).

Since the NTTR airspace includes several MOAs, restricted areas, and subdivisions, sorties at NTTR commonly result in multiple sortie-operations, particularly during major exercises. For example, during an average sortie an F-16 from Nellis AFB uses six different airspace units, totaling six sortie-operations. Figure 2-5 shows representative patterns of aircraft operations within NTTR; each of these patterns flies through multiple airspace units, resulting in multiple sortie-operations.

Previous review of NTTR sortie-operations established a low-to-high range for annual sortie-operations in order to account for year-to-year variations in use (Air Force 1999b). For a low-use year, a total of 200,000 sortie-operations occur in the NTTR airspace, whereas a total of 300,000 sortie-operations represent a high-use year. Table 2-9 presents sortie-operations by airspace unit for low-use and high-use years. The Air Force anticipates that sortie-operations in the NTTR airspace under the no-action alternative would continue to range between 200,000 and 300,000 per year in the foreseeable future.

Table 2-9 Baseline Sortie-Operations by Airspace Unit

Airspace Unit	*Low Use - 200,000 Annual Sortie-Operations*	*High Use - 300,000 annual Sortie-Operations*
Desert MOA	51,224	76,170
Reveille MOA	14,038	20,911
R-4806	30,134	44,135
R-4807	74,128	112,121
R-4808	12,952	20,008
R-4809	17,524	26,655
Total	**200,000**	**300,000**

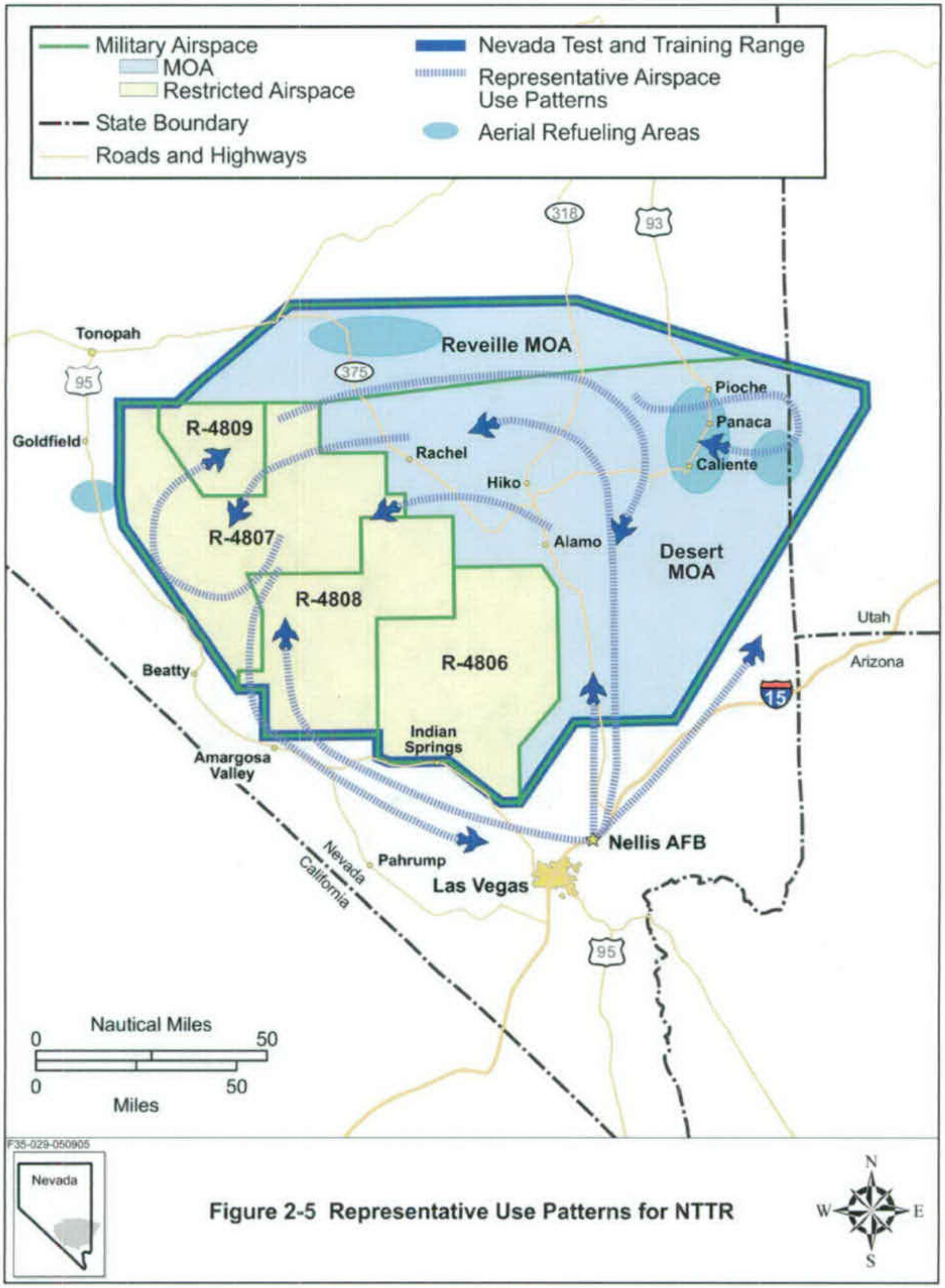


Figure 2-5 Representative Use Patterns for NTTR

Chaff and Flare Use

As with ordnance use, chaff and flare use in NTTR varies from year to year, depending upon the nature of testing and training performed. Under the no-action alternative, chaff use would continue to average approximately 400,000 bundles per year. Flare use would be approximately 250,000 units per year. The effectiveness of chaff and flares in combat requires training and frequent use by aircrews to master the timing of deployment and the capabilities of the devices, and to ensure safe and efficient handling by ground crews.

Chaff and flares form the principal defensive mechanisms dispensed from military aircraft to avoid detection or attack by adversary air defense systems. A bundle of chaff consists of approximately 500,000 to 3,100,000 1-inch long fibers smaller than the size of a hair that reflect radar signals and, when dispensed in sufficient quantities from aircraft, form a "cloud" that breaks the radar signal and temporarily hides the aircraft from radar detection. Flares provide high-temperature heat sources ejected from aircraft that mislead heat-sensitive or heat-seeking targeting systems. Chaff and flares are used to keep aircraft from being targeted by weapons such as surface-to-air missiles, anti-aircraft artillery, and other aircraft. Section 3.5 provides additional discussion on the composition and attributes of chaff and flares.

Chaff and flares are also used throughout many portions of NTTR. Their use is controlled in accordance with standard operating procedures detailed in AFI 13-212, Volume 1, Nellis AFB Addendum A (Air Force 2007a). Depending on daily chaff restrictions, self protection chaff may be employed in NTTR between 300 and 10,000 feet AGL. No chaff is authorized in R-4808 or R-4809A. Depending on the type of chaff used, types of use, and locations, altitudes authorized for release may vary. Periodically, restrictions will be published regarding the use of flares or chaff. Reasons may include extreme ground fire hazards, threats to ground property, high personnel injury potential, and Air Traffic Control radar interference.

2.3 PROPOSED ACTION

The Air Force proposes to base 36 F-35 fighter aircraft at Nellis AFB between 2012 and 2022. The aircraft would be assigned to the FDE program and WS at Nellis AFB. Flight activities would occur at Nellis AFB and NTTR. Table 2-10 presents the major milestones of the aircraft beddown schedule.

Table 2-10 Proposed Aircraft Inventory Change Schedule

Aircraft	*Baseline*	*2012*	*2015*	*2017*	*2022*
F-35 (FDE)	0	+6 (6)	+6 (12)	12	12
F-35 (WS)	0	0	0	+12 (12)	+12 (24)
Total F-35	**0**	**6**	**12**	**24**	**36**
Nellis AFB Based Aircraft*	113	113	113	113	113
Total	**113**	**119**	**125**	**137**	**149**

* Nellis AFB assigned aircraft include HH-60, A-10, F-15C, F-15E, F-16, F-22A

2.3.1 Nellis AFB

Proposed Beddown of the F-35

The Air Force proposes to establish an F-35 Division of the 422nd Test and Evaluation Squadron at Nellis AFB and an F-35 Division of the Air Force WS. The beddown of 36 F-35s would occur in four phases: six aircraft are scheduled to be assigned to the 422nd Squadron in 2012; six additional F-35s assigned in 2015; 12 aircraft assigned to the WS in 2017, with an additional 12 aircraft assigned to the WS in 2022. These aircraft would remain at Nellis AFB into the foreseeable future since the requirements for the FDE program and WS remain as long as the Air Force retains the F-35. The overall inventory of aircraft based at Nellis AFB (refer to Table 2-4) would remain unchanged with the exception of adding 36 F-35 aircraft; Nellis AFB, however, would experience a peak of 149 aircraft in 2022.

Proposed Nellis AFB Airfield Operations

By 2022, the 36 F-35s would conduct approximately 17,280 annual airfield operations. Table 2-11 presents details regarding the total airfield operations that would occur at the completion of the F-35 beddown when the Nellis AFB aircraft inventory would be at its peak.

Table 2-11 Projected F-35 Airfield Operations at Nellis AFB During Peak Year 2022

Details of Airfield Operations	*Baseline Nellis AFB Airfield Operations*	*Proposed F-35 Airfield Operations*	*Total With F-35*
Day (7:00 a.m. to 10:00 p.m.)	79,556	16,174	95,730
Night (10:00 p.m. to 7:00 a.m.)	6,073	1,106	7,179
Total	**85,629**	**17,280**	**102,909**

*An *airfield operation* represents the single movement or individual portion of a flight in the base airfield airspace environment such as one takeoff, one landing, or one transit of the airport traffic area.

At the peak year, approximately 93 percent of the total airfield operations would occur during the day (7:00 a.m. - 10:00 p.m.) as defined for the purposes of environmental analysis. Additional F-35 airfield operations would result in a 20 percent increase in overall day operations at the base and an 18 percent increase in the overall night (10:00 p.m. - 7:00 a.m.) operations after completion of the F-35 beddown in 2022. Existing standard departure and arrival routes would be used by the F-35. Approximately 53 percent of the flying missions would involve a northeast departure, with the aircraft following existing tracks to the north for entry into NTTR. Approximately 47 percent of the flights would involve a southwest departure and follow existing tracks to the north into NTTR.

Proposed Facilities and Infrastructure Construction and Modification

The proposed F-35 beddown would require construction of new facilities, and alteration and demolition of existing facilities. The Air Force identified five primary areas (A, B, C, D, and MSA) of facility and infrastructure construction and modification (Figure 2-6). Currently, numerous projects have been identified which would occur in Areas A, B, and C located on the southeastern side (or primary side) of the flightline. Several projects would occur in Area D (eastern side of runways) with additional projects in the MSA. Table 2-12 summarizes the anticipated construction, demolition, and renovation to support the proposed F-35 beddown at Nellis AFB. It also presents the anticipated sequence of infrastructure changes over the period from 2009 through 2014. Proposed projects may be changed or additional projects identified as the beddown progresses. If this occurs, the appropriate NEPA documentation will be undertaken to assess potential impacts.

Table 2-12 Proposed Construction and Demolition Actions for the F-35 Beddown

Project	*Area (square feet)*	*Base Area*	*Year*	*Demolish Building #*
East Ramp/Airfield Pavement	118,400	D	FY09	
FY09 Subtotal	***118,400***			
A-10 Thunder Aircraft Maintenance Unit (AMU)	11,000	B	FY10	
6-Bay F-35 Hangar/AMU	80,988	B	FY10	265, 268, 269
Aircraft Washrack Addition, 1-bay to Building 271	9,551	B	FY10	
B10425 Munitions Facility Addition at Building 10425	3,000	MSA	FY10	
2 F-35 Munitions Igloos	4,800	MSA	FY10	
25-mm Munitions Storage Facility Addition at M81	3,000	MSA	FY10	
Munitions Trailer Facility	10,000	MSA	FY10	
2 MSA Loading Docks	1,000	MSA	FY10	
Precision-Guided Missile Bay Addition at Building 10439	3,000	MSA	FY10	
Parking/landscape areas	15,656	B	FY10	
FY10 Subtotal	***141,995***			
Aerospace Ground Equipment (AGE) Complex	45,000	A	FY11	
Weapons Release Building	15,000	B	FY11	441
53 WG Test Squadron Operations Building	20,000	C	FY11	
East Ramp/Airfield Pavement	129,167	D	FY11	
Parts Store	40,000	B	FY11	413, 415
Engine Shop Addition	9,000	C	FY11	
FY11 Subtotal	***258,167***			
East Ramp/Airfield Pavement	495,140	D	FY13	
Live Ordnance Loading Area (LOLA) Expansion	167,322	D	FY13	
Weapons School Addition at Building 282	10,000	B	FY13	
3 F-35 Munitions Igloos	7,200	MSA	FY13	
Bomb Build-Up Pad	30,000	MSA	FY13	
Parking/landscape areas	190,301	B	FY13	
FY13 Subtotal	***899,963***			
Low Observables (L/O) Composite Addition	11,018	B	FY14	
4-Bay F-35 Hangar/Strike AMU	31,000	B	FY14	258
L/O Corrosion/Wash 3-Bay Hangar	15,800	B	FY14	250
Parking/landscape areas	96,486	B	FY14	
FY14 Subtotal	***154,304***			
Total	**1,572,829**			

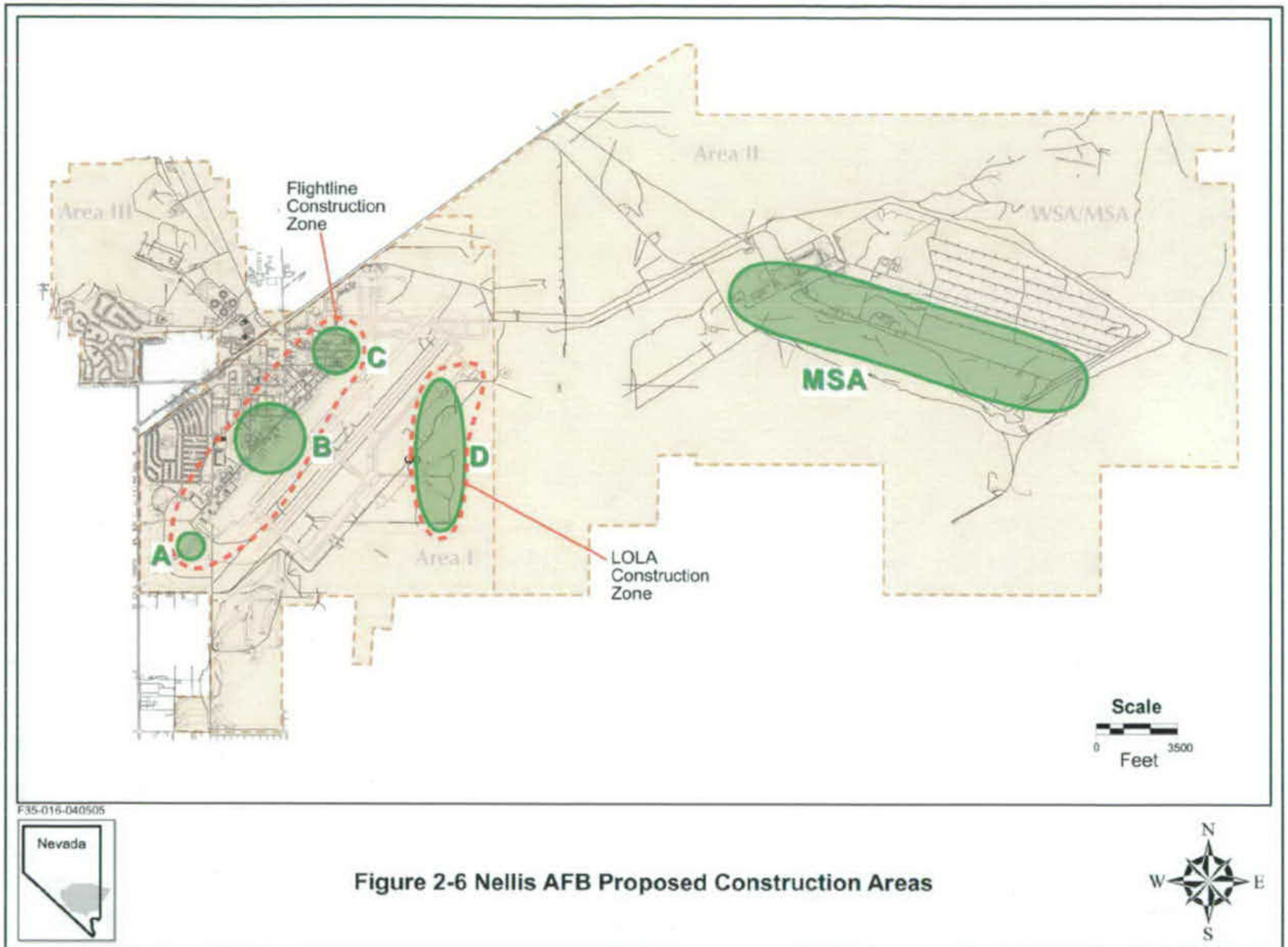


Figure 2-6 Nellis AFB Proposed Construction Areas

Facility construction would encompass about 29 acres with an additional 7 acres for landscaping and parking. The majority of facilities would be completed before the aircraft beddown began to ensure availability of needed support functions for the F-35. Utility infrastructure upgrades would occur within the footprints of existing communication, energy, and water lines. The majority of construction, demolition, and renovation actions would occur along the flightline in Areas B and C. An ammunition maintenance/storage facility would be constructed for the JDAMs in the northeast portion of the MSA in association with other munitions storage areas. Its location would be consistent with safety requirements that specify sufficient separation among munitions facilities and from other land uses.

As the aircraft beddown progresses, it is anticipated that there could be numerous construction activities, unidentified in the current proposal, but could arise indirectly because of the proposed action. While these are unknown at this time, most, if not all, would be minor construction projects and/or projects much smaller in scope (e.g., remodeling, adding small additions, re-paving roads) than those listed in Table 2-12. Since it is impossible to identify all of these projects at this time, the Air Force will ensure that the appropriate NEPA documentation will be performed prior to implementation. Those projects that are consistent with this action and of little environmental impact will be tiered to this document. Those actions which may have a larger impact or are greatly out of the scope of this document will be analyzed separately.

Proposed Personnel Changes

Personnel positions at Nellis AFB would be increased by a total of 412 by completion of the beddown in 2022. Personnel changes begin in 2012 with a total of 222 personnel being added at the base to support the FDE program in years 2012 and 2015. In 2017, before the start of the WS program, another 175 personnel would be added. In 2022, an additional 15 personnel would arrive at which point personnel positions at Nellis AFB would peak. The F-35 FDE and WS personnel would constitute a 3.4 percent increase in overall 2006 base personnel levels of 12,284. These personnel positions have been developed for Air Force military and civilian employees in direct support of the F-35 FDE and WS programs. Ancillary increases to the local population are likely but are impossible to accurately predict; but they could be as many as several hundred. The majority of these personnel would be contractor employees of aircraft manufacturers. Fluctuations in programs, funding, and staffing would continue at Nellis AFB, likely making such a minor change unnoticeable.

2.3.2 Nevada Test and Training Range

Proposed Use of Nevada Test and Training Range

The proposed action of the F-35 beddown would not alter the structure, management, or safety procedures at NTTR. Existing instrumentation, currently planned upgrades, and existing threat emitters would suffice for the F-35 FDE program and WS.

By 2012, the F-35 would begin to conduct ordnance delivery of any munitions capable of being deployed by the F-16 and A-10. The JDAM represents the principle munitions expected to be carried by the F-35 with the exception of depleted uranium anti-tank rounds. JDAMs consist of 500; 1,000; and 2,000-pound bombs guided to the target by an attached Global Positioning System (GPS) receiver. Once the weapon has been programmed with the target position in GPS coordinates, it can be delivered in any weather and visibility conditions. These weapons do not require any laser guidance. Roughly 50 percent of the JDAMs used by the F-35s would consist of inert ordnance; the other 50 percent would be live ordnance. All munitions releases would occur on approved targets and ranges within NTTR. Table 2-13 presents the average annual use of ordnance, chaff, and flares at NTTR. Based on the total tonnage of ordnance used on NTTR from 1991 through 1995, use of ordnance by the F-35s would represent a 6 to 10 percent contribution to the total, depending on year-to-year variations. Chaff use would contribute approximately 18 percent of the total, again, depending on year-to-year variations. Due to its stealth characteristics, the Air Force expects the F-35 to employ flares less frequently than legacy aircraft. Total F-35 flare use would comprise 2 percent of NTTR total. The F-35 would use ordnance within the parameters and restrictions applicable to NTTR. No new safety procedures or restrictions would be needed to accommodate F-35 testing and WS activities at NTTR.

Table 2-13 Average and Proposed Annual Use of Ordnance, Chaff, and Flares at NTTR

	Ordnance	*Chaff*	*Flares*
Other Aircraft	3,000 to 4,500 tons (50% inert)	400,000 bundles	250,000
F-35	180 to 300 tons (50% inert)	74,000 bundles	16,000

Proposed F-35 Use of the Nevada Test and Training Range Airspace

As a supplement for the F-16 and A-10 aircraft, the F-35 would adopt similar missions and training programs. Therefore, the Air Force expects that the F-35 FDE program and WS would use NTTR in a similar manner to the F-16 and A-10 programs. No changes would need to occur to NTTR airspace structure or management as a result of the proposed action. All F-35 sortie-operations would take place in existing approved NTTR airspace.

The nature and duration of F-35 flight activities would be the same under both the FDE program and WS. Although each program focuses on different goals and requires different instrumentation, they provide feedback to each other in order to produce the best available tactics and capabilities (refer to Table 2-2, which details the primary test and training activities projected for F-35s under the FDE program and WS). Missions flown by aircraft assigned to either the FDE program or the WS would operate within the general flight parameters discussed previously. F-35 missions would concentrate on testing and evaluating flight maneuvers and tactics to fully develop the combat capability of the aircraft. The WS F-35 flight activities would follow a syllabus of approximately 35 missions over a 6-month period designed to simulate different combat scenarios and teach advanced tactics developed and/or evaluated by the FDE program. Some of the F-35 missions would include aerial refueling with tankers, using existing tanker aircraft already operating in high-altitude refueling tracks over NTTR.

Using the full array of authorized capabilities of NTTR, the F-35 can operate from a low altitude of less than 500 feet AGL up to 50,000 feet MSL or higher. However, the F-35 would most often operate at median altitudes of 5,000 to 25,000 feet MSL or higher. Table 2-14 presents the projected altitude profile for F-35 operations in NTTR airspace.

Table 2-14 Projected F-35 Altitude Profile

Altitude	*Feet*	*Percent Time*
Very Low	< 500 feet AGL	10
Low	500 feet AGL to 5,000 feet MSL	20
Medium	5,000 to 25,000 feet MSL	45
High	> 25,000 feet MSL	25

The need for the F-35 to fly at lower altitudes stems from its missions associated with close air support and similar operations. Nonetheless, 70 percent of F-35 sortie-operations would occur above 5,000 feet MSL. Given that the F-35 will supplement and potentially replace both the F-16 and A-10, its altitude profile represents a blending of both mission types.

To test and train with the full capabilities of the aircraft, the F-35 would employ supersonic flight. All supersonic flight would occur at altitudes and within airspace already authorized for such activities. Flight activities leading to supersonic events would commonly involve use of subdivisions of the Desert MOA and portions of restricted areas depicted in Figure 2-4. The Air Force anticipates that approximately 3.5 percent of the time conducting air combat maneuvers would involve supersonic flight. In comparison, F-16 aircraft conduct supersonic flight for 10 percent of the time when conducting air combat maneuvers. Inclusion of F-35 sortie-operations would raise overall supersonic activity in NTTR by less than 1 percent. It is anticipated that most of these operations would occur above 25,000 feet MSL.

Past patterns of use for NTTR demonstrated that annual sortie-operations ranged from 200,000 to 300,000 with the existing and authorized aircraft at Nellis AFB and common usage by others (Air Force 1999b). Operations by F-35 would add to these totals, reaching to between 251,840 and 351,840 from 2022 onward; total sortie-operations would increase by 26 percent under the low scenario and 17 percent under the high scenario.

The 8,460 *sorties* by the F-35 would represent approximately 51,840 *sortie-operations* in the major airspace units encompassed by NTTR (Table 2-15). The number and distribution of F-35 sortie-operations derive directly from the use patterns of FDE program and WS for F-16 and A-10 aircraft. F-35 sortie-operations would represent a 26 percent contribution to the total NTTR sortie-operations under the low-use (51,840 annual sortie-operations) scenario and 17 percent contribution under the high-use (51,840 annual sortie-operations) scenario.

Table 2-15 Projected F-35 Sortie-Operations by Airspace Unit

Airspace Unit	*Low-Use*			*High-Use*		
	F-35	*All Aircraft*	*Percent Increase Over Baseline*	*F-35*	*All Aircraft*	*Percent Increase Over Baseline*
Desert MOA	15,480	66,704	30	15,480	91,650	20
Reveille MOA	4,207	18,308	30	4,207	25,181	20
R-4806	4,322	34,456	14	4,322	48,457	10
R-4807	19,683	93,810	27	19,683	131,804	18
R-4808[1]	3,368	16,321	26	3,368	23,376	17
R-4809	4,717	22,242	27	4,717	31,372	18
Total	**51, 840**	**251,840**	**26**	**51, 840**	**351,840**	**17**

[1] DOE Airspace overlying NTS; sortie-operations transit only

Although the F-35's stealth features reduce its detectability, it will employ chaff and flares as defensive countermeasures. For the FDE program and WS, the F-35s would dispense chaff as part of testing and training. Chaff use would follow all requirements and restrictions currently applicable at NTTR. Under the proposed action, F-35s would use 74,000 bundles of chaff per year for the full complement of 36 aircraft in 2022 and after. This amount contributes approximately 18 percent of the total chaff use for NTTR relative to annual use levels of 400,000 bundles.

Currently, approximately 250,000 flares are dispensed annually over NTTR. Flare use operates under minimal altitude restrictions to ensure safety, as noted previously. These minimum altitudes provide sufficient time for complete combustion and consumption of the flares before potential contact with the ground. The altitude restrictions provide a buffer against inadvertent low releases that might result in burning material contacting the ground.

Flare use for the F-35s would adhere to all Nellis AFB and ACC directives including release altitude standards. F-35s are anticipated to use the same types of flares as other fighter aircraft (e.g., F-16). These minimum standards ensure complete burn-out of flares at least 100 feet above the ground or higher. In NTTR's MOAs, the minimum flare release altitude would remain unchanged at 5,000 feet AGL, for all aircraft including F-35s. Based on the flight altitude profile for the F-35, the Air Force anticipates that roughly 70 percent of F-35 flare release throughout NTTR (including restricted areas) would occur above 5,000 feet MSL. The F-35 would employ approximately 16,000 flares per year over NTTR and contribute 6 percent to total flare use by all aircraft, depending upon annual variations in activities.

2.4 ENVIRONMENTAL IMPACT ANALYSIS PROCESS AND OTHER REGULATORY REQUIREMENTS

This section outlines the elements of the process and other regulatory requirements. It also addresses public involvement.

2.4.1 Environmental Impact Analysis Process

This EIS was prepared in conformance with NEPA and associated regulations. NEPA (Public Law 91-190, 42 U.S.C. 4321-4347, as amended) was enacted to establish a national policy for the protection of the environment. It also established the CEQ to implement the provisions of NEPA and review and appraise federal programs and activities in light of NEPA policy. CEQ developed regulations for implementing the procedural provisions of NEPA (40 CFR Parts 1500-1508). These regulations outline the responsibilities of federal agencies under NEPA and provide specific procedures for preparing EISs to comply with NEPA; 32 CFR Part 989, which implements the CEQ regulations with regard to Air Force actions, defines the steps and milestones in the Environmental Impact Analysis Process (EIAP). Major milestones in the EIAP for the proposed F-35 beddown at Nellis AFB include the following:

- publishing of a Notice of Intent (NOI) to prepare an EIS;
- conducting public scoping meetings and inviting public and agency input to determine and define the significant issues to be addressed in the EIS;
- collecting data on the affected environment to provide a baseline for analyzing the effects of the proposed action;
- assessing the potential impacts of the proposed action and no-action alternative on the environment;
- preparing and distributing a Draft EIS for public review and comment;
- establishing a public review period, including public hearings to solicit comments on the analysis presented in the Draft EIS;
- preparing and distributing a Final EIS incorporating all comments received on the Draft EIS and responding to the substantive issues raised during the public review period; and
- publishing a Record of Decision (ROD) no sooner than 30 days after the availability of the Final EIS, outlining the Air Force's decision.

2.4.2 Other Regulatory Requirements

Permits: Should the proposed action be implemented, the Air Force would need to update existing permits or obtain new ones. These permits would apply to the removal and disposal of asbestos as a result of demolition of, and modifications to, on-base buildings; construction of new buildings (as needed); and updating existing operating permits under the Clean Air Act.

Asbestos Removal and Disposal: Prior to demolition or additions to buildings, asbestos surveys are required by Air Force regulation. For the removal of asbestos, a notification process with Clark County, the state health board, the United States Environmental Protection Agency (EPA), and the base hazardous waste coordinator is required. Removal would be contracted to state-certified and licensed contractors and removed and managed in accordance with the Asbestos Management and Operations Plan (Air Force 2003a). Contractors will obtain the necessary permits for the removal, handling, and transportation of asbestos. Contractors must have access to a permitted landfill for asbestos disposal.

Construction: The base must submit building plans and a request for location to the base zoning and development board for new buildings. An air quality dust permit must be obtained from Clark County if the building site causes 0.25 acre or more of topsoil disturbance. The Clark County Surface Disturbance Permit would be applied for by Nellis AFB after finalization of the building footprints and prior to construction.

Energy Conservation: Executive Order 13423 *Strengthening Federal Environment, Energy, and Transportation* requires all federal agencies to implement petroleum and water conservation measures, pollution prevention and recycling practices, and reduction or elimination of toxic or hazardous chemicals. New construction and major renovation of buildings must comply with the 2006 *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings set forth in the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding.*

Title V Permit: Modifications to the current base-wide Title V Permit will be required if equipment other than mobile aircraft maintenance equipment were added or replaced. Due to a base exemption, no modifications are required for changes or additions to mobile equipment used to maintain or service planes on the ground (e.g., aerospace ground equipment). However, Clark County air quality operating permits for individual pieces of equipment will have to be modified for all changes. All modifications to the Title V Permit and the Clark County air quality operating permits and authority to construct will be applied for by Nellis AFB after finalization of equipment needs.

Nellis AFB Plans and Protocols: In addition to the federal, state, and local regulations, Nellis AFB institutes its own implementing regulations and guidance. Table 2-16 lists the plans and reports Nellis AFB produces to ensure compliance with federal, state, and local regulations.

Table 2-16 Nellis AFB Environmental Plans		
Resource Area	***Title***	***Date***
Cultural Resources	Integrated Cultural Resources Management Plan	2007
Air Quality	Nellis AFB Air Emissions Inventory	2006
	NTTR Air Emissions Inventory	2004
Environmental Restoration Program	Environmental Restoration Plan Management Action Plan	2004
Noise, Land Use and Planning	Air Installation Compatible Use Zone Study	2004
	General Plan for Nellis Air Force Base Includes General Plan Summary for Indian Springs Air Force Auxiliary Field	2002
Asbestos	Asbestos Management and Operations Plan	2003
Lead-Based Paint	Lead-based Paint Management Plan	2003
Environmental Emergencies	Facility Response Plan	2006
Hazardous Waste	Hazardous Waste Management Plan	2002
Hazardous Materials	Hazardous Materials Management Plan	2006
Natural Resources	Integrated Natural Resources Management Plan	1999*
Stormwater	Storm Water Pollution Prevention Plan	1998

*Revision expected in 2007

Agency Consultation: Both NEPA and CEQ regulations require intergovernmental notifications prior to making any detailed statement of environmental impacts. Through the process of Interagency and Intergovernmental Coordination for Environmental Planning (IICEP), concerned federal, state, and local agencies (such as the USFWS, Bureau of Land Management [BLM], Nevada Division of Environmental Protection, and the Nevada State Historic Preservation Officer [SHPO]) must be notified and allowed sufficient time to evaluate potential environmental impacts of a proposed action. This was accomplished in two ways: 1) agencies were contacted early in the EIS process through interagency correspondence to solicit their comments on the proposed action and no-action alternative, and 2) the Air Force also conducted scoping meetings. Appendix A provides a summary of public participation and consultation including a copy of the IICEP letter sent to agencies, a list of recipients, and any responses received. Comments from these agencies were reviewed for incorporation into the environmental analysis for this EIS.

Government-to-Government Consultation: Several laws and regulations address the requirement of federal agencies to notify or consult with American Indian tribes or otherwise consider their interests when planning and implementing federal undertakings. In particular, on April 29, 1994, the President issued the *Memorandum on Government-to-Government Relations with Native American Tribal Governments*, which specifies a commitment to developing more effective day-to-day working relationships with sovereign tribal governments.

As part of the NEPA process, 37 members of the Nellis AFB Native American Program (NAP), who represent 17 tribes with historical ties to the land in the vicinity of NTTR, were notified at the initiation of the project as part of an ongoing government-to-government consultation between Nellis AFB and these tribes. The list of consulted tribes is presented in Appendix A. Keith Myhrer, Archaeologist and NAP Manager coordinated consultation between the Air Force and the tribes. In 1999, the representatives elected five members to a Document Review Committee (DRC) who reviews environmental documents, coordinate with tribal members, and provide comments to represent the members of the NAP from 17 tribes. The DRC will be involved in the review of this EIS.

2.4.3 Public Involvement Process

CEQ regulations governing the NOI and scoping and 32 CFR Part 989 require an early and open process for identifying significant issues related to a proposed action and obtaining input from the public prior to making a decision that could potentially affect the environment. These regulations specify public involvement at various junctures in the development of an EIS, including public scoping prior to the preparation of a Draft EIS, and public review of the Draft EIS prior to finalizing the document and making a decision. Appendix A of this EIS includes a summary of public participation and the materials disseminated during this process.

This EIS adhered to these requirements by using public scoping and federal, state, and local agency input to assist in focusing the discussion on potentially significant issues. Identifying those issues and topics warranting detailed discussion in this EIS involved three primary steps: 1) soliciting issues from the public through the scoping process and from agencies and American Indian Tribes through the IICEP process; 2) reviewing all identified issues and determine if they would actually be affected by the proposed action; and 3) determining those resources (e.g., air quality, land use) and subsets of resources (e.g., environmental justice as a part of socioeconomics) that represent significant issues. Those issues determined to not warrant further detailed study are described in the following sections along with the justification for their exclusion.

Prior to the publication of the Draft EIS, the public involvement process included publishing the NOI in the *Federal Register* on August 23, 2004. After public notification in newspapers and radio stations, five scoping meetings, averaging 2 hours in duration, were held September 13 through September 17, 2004 at the following Nevada locations: Carson City, Alamo, Pioche, Pahrump, and Las Vegas. A total of 40 people attended the meetings and provided comments. By the end of the scoping period, October 1, 2004, nine written comments and one agency letter were received.

Following these scoping meetings, the Air Force prepared this Draft EIS and made it available to the public and agencies for review and comment. The document was sent to those in the public who requested a copy and was made available at selected public facilities such as libraries and local government agencies within Nevada. The public review and comment period for the Draft EIS will last 45 days from publication of its availability. During this time hearings, will be held to provide an opportunity for the public to comment on the analysis contained within the Draft EIS.

Comments received during this public review and comment period will be addressed in the Final EIS and provided to the decision maker for consideration. A copy of the Final EIS will be published and made available to the public. The Final EIS will include responses to comments and questions received during the public comment period. After a minimum of 30 days of review, the Air Force may publish a ROD. The ROD will specify the selected alternative, how it will be implemented, and mitigation measures, if any, that will be employed to minimize adverse environmental impacts.

Issues Derived from Public Scoping and IICEP. Of the nine written comments received from individuals during the scoping meetings, three citizens from Alamo expressed concern about sonic booms – the number, severity, potential for structure (i.e., window) damage, and human disturbance. One of the commentors asked if a restricted area could be created over the town. Two other areas of concern were how the F-35 would operate and the way in which it would fly within current airspace. In Las Vegas, one commentor asked if the F-35s would be used in the same way at the range (e.g., flights per day, how low, how fast) while another commentor expressed concerns about noise, radar interference, safety for the residential areas to the east, and EPA results. One person in Pioche commented that during the Fall hunting season, deer appeared to be scared by early morning flights in airspace over the central portion of NTTR. In Carson City, two attendees verbally (i.e., no written comments were received) expressed concern for potential low-altitude flight conflicts over areas being considered and/or used for wind generation under the NTTR airspace.

A letter from the Nevada State Clearinghouse with comments from the SHPO and Nevada Department of Wildlife was received during the scoping period. The SHPO indicated that once specific information is known about flight patterns and construction, it should be notified so that it can determine the potential for adverse impacts to religious, cultural, and historic properties and to specify the process to be taken to address federal laws. The Nevada Department of Wildlife expressed concern for three state-listed species: 1) the Phainopepla (*Phainopepla nitens*), a state-imperiled neotropical migrating bird; 2) the burrowing owl (state vulnerable species); and 3) the kit fox, a species of conservation priority in Nevada. No other agency comments were received during the scoping period.

Assessment of Identified Issues. Identified issues correlate to one or more resource categories used in environmental analysis. For example, an issue raised concerning the effects of sonic booms would apply to several resource categories including noise, land use, biological resources (wildlife), cultural resources, and recreation. Scoping, IICEP, and Air Force internal evaluation yielded potential issues correlating to nine resource categories (Table 2-17). Each resource category (and its subsets) was analyzed to determine if and how the proposed action would affect it. This was accomplished by:

- identifying the types and location of all elements of the proposed action;
- determining the relationship or interaction of these elements with the resources and their subsets; and
- assessing if and how these resources and subsets would be affected.

Table 2-17 F-35 Scoping of Issues for Environmental Impact Analysis Process			
Resource	***Public/Agency/ Air Force Scoping***	***Affected Area***	
		Nellis AFB	*NTTR*
Airspace and Aircraft Operations	X	X	X
Noise: Subsonic Supersonic	X X	X NA	X X
Air Quality	X	X	X
Safety	X	X	X
Land Use and Recreation	X	X	X
Socioeconomics and Infrastructure	X	X	NA
Environmental Justice and Protection of Children	X	X	NA
Soils and Water Resources	X	X	NA
Biological Resources	X	X	X
Cultural Resources	X	X	X
Hazardous Materials/Waste	X	X	NA

Notes: NA = Analysis not discussed in detail in EIS

2.5 SUMMARY OF IMPACTS

Table 2-18 presents a summary of the impacts associated with the proposed beddown of 36 F-35 aircraft for the FDE program and WS at Nellis AFB. The table compares the effects of the proposed action to those of the no-action alternative.

Table 2-18 Comparison of Alternatives by Resource and Potential Impact	
Proposed Action	***No-Action Alternative***
AIRSPACE AND AIRCRAFT OPERATIONS	
Nellis AFB	
• Increase total Nellis AFB airfield operations by 20 percent • No change to airfield airspace structure or operational procedures; no impact to civil and commercial aviation airspace • No change in departure and arrival routes	• Average annual airfield operations remain at 85,000 • Existing departure and arrival routes remain unchanged
NTTR	
• No change to current special use airspace structure • F-35 would increase current total sortie-operations by 51,840 annually, for a total ranging from 251,840 to 351,840. This would represent a 26 percent increase under the 251,840 use scenario and a 17 percent increase under the 351,840 scenario. This increase would not exceed NTTR capability • A less than 1 percent increase in supersonic activities • No changes or increased need for supersonic-designated airspace • No impact to civil and commercial aviation	• MOAs and restricted areas unchanged • Continue to conduct 200,000 to 300,000 annual sortie-operations in NTTR • Maintain and use existing supersonic-designated airspace • Continued coordination with area Air Traffic Control to ensure safe airspace for all users

<table>
<tr><th colspan="2">Table 2-18 Comparison of Alternatives by Resource and Potential Impact (con't)</th></tr>
<tr><th>Proposed Action</th><th>No-Action Alternative</th></tr>
<tr><td colspan="2">NOISE</td></tr>
<tr><td colspan="2">Nellis AFB</td></tr>
<tr><td>• Beddown would generate a 85 percent increase (an additional 15,333 acres) in areas exposed to 65 DNL and greater by the year 2022
• Nellis AFB would continue noise abatement procedures to reduce overflights of residential areas and nighttime operations and run-ups
• Noise complaints and annoyance levels in the Nellis AFB vicinity may increase
• No adverse impacts to hearing and health would be anticipated</td><td>• Approximately 18,000 acres exposed to noise greater than 65 DNL
• No change in existing noise abatement or safety procedures</td></tr>
<tr><td colspan="2">NTTR</td></tr>
<tr><td>• Subsonic noise would increase an average of 3 dB in 12 of the 21 airspace units under the 251,840 sortie-operations scenario and in 4 of the 21 airspace units under the 351,840 sortie-operations scenario
• Supersonic noise would increase by 1 dB in the Reveille MOA and 2 dB in portions of R-4807 and R-4809 under the 251,840 scenario
• Under the 351,840 scenario, supersonic noise would increase by 1 dB
• Sonic booms would increase by 2 per month in R-4807 and by 1 per month in Desert and Reveille MOAs under the 251,840 scenario
• Under the 351,840 scenario, booms would increase by 2 per month in almost all airspace units with the exception of the Elgin MOA where booms could increase by 4 per month
• Noise complaints and annoyance levels may increase due to increased boom numbers
• No adverse impacts to hearing and health</td><td>• Baseline subsonic noise levels would continue to range from less than 45 to 65 DNL for the 200,000 and 300,000 scenarios
• Supersonic noise levels would continue to range from less than 45 to 57 CDNL under the 200,000 and 300,000 scenarios
• Sonic booms range from 2 to 24 per month at 200,000 sortie-operations per year and 3 to 35 per month at 300,000 sortie-operations per year</td></tr>
<tr><td colspan="2">AIR QUALITY</td></tr>
<tr><td colspan="2">Nellis AFB</td></tr>
<tr><td>• Proposed construction, aircraft and equipment, and personnel vehicle commuting emissions would contribute less than 1 percent of all criteria pollutant emissions in any year; not exceeding to 10 percent threshold of regional significance
• De minimis levels would be exceeded for CO, and NO_x; however, the Air Force is coordinating with Clark County's Department of Air Quality and Environmental Management to include the 185 tons of NO_x into their ozone State Implementation Plan (SIP) revision
• CO exceedences are already covered in the Clark County CO SIP so these increases would not be adverse nor preclude the county from NAAQS attainment
• No visibility impairments to PSD Class I areas</td><td>• Nellis AFB would continue to contribute less than 1 percent of all criteria pollutant emissions in Clark County</td></tr>
</table>

Table 2-18 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	***No-Action Alternative***
NTTR	
• Projected emissions would increase negligibly in Nye and Lincoln counties; this would not change the regional significance from baseline conditions • No impairment of visibility in PSD Class I areas would occur	• Nye and Lincoln Counties (airspace within Clark County is minimal) would continue in attainment for all criteria pollutants • Within Lincoln County, NTTR operations would continue to represent a regional contributor of less than 9.7 percent for any criteria pollutant • Within Nye County, NTTR operations will continue to represent a regional contributor of NO_x at 14.73 to 22.09 percent for the low- and high-use scenarios, respectively • No impairment of visibility due to NTTR activities would occur for PSD Class I areas
SAFETY	
Nellis AFB	
• No changes in safety due to operations and maintenance, fire and crash response, and munitions use and handling procedures • Additional munitions facilities and expansion of the live ordnance loading area would be constructed to support the increase in airfield operations; this would enhance safety • No anticipated increase to bird/wildlife-aircraft strike hazards or aircraft mishaps above baseline levels therefore, no impacts	• Operations and maintenance, fire and crash response, and munitions use and handling activities conducted on Nellis AFB would continue to be performed in accordance with applicable Air Force safety regulations • Mishaps would remain limited; in the last 5 years, there have been two Class A aircraft accidents on Nellis AFB, while over 340,000 airfield operations have been conducted • Bird/wildlife-aircraft strikes in the airfield environment would remain minimal; over a 14-year period there have been 233 bird strikes (occurring with over 1 million airfield operations), averaging about 17 per year
NTTR	
• All current fire risk management procedures would remain unaffected due to the F-35 beddown • Estimated time between Class A mishaps would remain low (2 to 45 years) with the increase in NTTR airspace use • Increase in use of flares (6 percent); could cause a negligible (<0.1 percent) increase risk of wildfires; however, existing fire response procedures would adequately address this minimal increase • No significant increase in bird/wildlife-aircraft strike hazards	• A total of approximately 4 to 5 fires, of less than 3 acres, occur annually on the ranges; this would continue • Estimated time between Class A mishaps within NTTR airspace ranges between 3 and 68 years under the 200,000 sortie-operations scenario and 2 and 45 years under the 300,000 sortie-operations scenario • Safety procedures for ordnance, chaff, and flare use would continue to be enforced to minimize risks • Probability of bird/wildlife-aircraft strikes would continue to be negligible; ten strikes have been reported over the past 10 years

Table 2-18 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	***No-Action Alternative***
LAND USE AND RECREATION	
Nellis AFB	
• Total acreage impacted by noise levels greater than 65 to 70 DNL would increase by 8 percent; however, no change to land status or management is anticipated • Noise levels exceeding 65 DNL could affect an additional 13,917 persons and continued incompatibility with residences would occur • 11 more sensitive receptors would be affected mostly within the 65 to 75 DNL contours • No impact to recreation	• Surrounding area would continue to include industrial, commercial, open, recreational, public, and residential land uses • Current noise levels exceeding 65 DNL affect about 50,950 people • 8,061 acres of residential lands surrounding the base are already zoned for noise levels above 65 DNL • 35 noise sensitive receptors would continue to be subject to noise levels of 65 DNL or greater
NTTR	
• No change to land status or land management • 3 dB or less change in subsonic noise and 1 dB or less change in supersonic noise levels over special use land management areas • Recreational areas underlying the Elgin MOA could experience an increase of 4 booms per month with the maximum sortie-operations (351,840) scenario; other areas might expect an increase of up to 2 booms per month • Aircraft emissions and overflights would not impair visual quality	• NTTR lands would continue being primarily managed by DoD, BLM, USFWS, and U.S. Forest Service • Special use land management areas would remain unchanged
SOCIOECONOMICS AND INFRASTRUCTURE	
Nellis AFB	
• Net increase of 412 active duty personnel at Nellis AFB by 2022 (3.4 percent increase over 2006) • Nearly $28.3 million in additional payroll disbursements with increased personnel • Adequate housing and utility supply; no adverse impact on area public schools • Increase in traffic during construction would be temporary and localized; should not adversely impact existing delays experienced by on-base traffic • No appreciable changes, to utilities ability to meet minor increases in demand	• No change in Nellis AFB active duty or civilian workforce which totaled 12,284 in 2006 • Total annual payroll expenditures in 2006 of more than $857 million • Housing and utility supply would remain unchanged; no change in public school enrollment • Delays at particular Nellis AFB intersections currently exist
ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN	
Nellis AFB	
• Noise levels of 65 DNL or greater would affect approximately 27,007 people belonging to minority groups and about 10,387 low-income populations (42 and 16 percent, respectively of the total affected population) • An additional 7 schools would be exposed to noise levels of 65 DNL or greater; however, safety risks to children would not increase	• Impacts to human health and environmental conditions in minority and low-income communities would remain unchanged • The number of schools currently affected by noise levels 65 DNL or greater would remain unchanged

Table 2-18 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	***No-Action Alternative***
SOILS AND WATER RESOURCES	
Nellis AFB	
• Approximately 36 acres would be disturbed over a 8-year construction period; most of the proposed construction would occur over previously developed land or replace existing buildings • Best management practices (e.g., erosion and dust controls) for construction would minimize the potential for erosion • No adverse effects to availability of surface water or groundwater; no additional water right required	• Nellis AFB would continue to implement standard construction and erosion control procedures to limit erosion for planned/approved construction projects • Existing water availability and use rates would continue to be adequate for base missions and personnel
BIOLOGICAL RESOURCES	
Nellis AFB	
• One federally-listed special status species (desert tortoise) found on Nellis AFB; the base would avoid this species and consult with USFWS as applicable • Of the two plant and four animal state-sensitive species known to occur on Nellis AFB, only the burrowing owl and the chuckwalla could be impacted. Nellis AFB would work with the Nevada Department of Wildlife to avoid impacts to these sensitive species	• The desert tortoise would not be affected; existing plans would continue to address management and protection of this species • The status of two plant and four animal state species of concern would not change
NTTR	
• Flare use would increase by 6 percent, but the risk of wildfire would remain minimal • Use of existing targets; therefore, no new ground disturbance on NTTR • No changes in existing impacts to the desert tortoise would be anticipated; implementation of the rules and procedures in management of this species would continue to minimize any potential impacts • Increases to subsonic (3 dB) and supersonic (1 dB) noise would not adversely impact wildlife	• The only federally-listed species occurring on the ranges is the desert tortoise within the South Range; implementation of existing rules and procedures in relation to this species would continue
CULTURAL RESOURCES	
Nellis AFB	
• Construction would avoid a National Register-eligible site in Area II • Cold War structure inventory is in progress but any potentially eligible sites would be avoided • No effect on traditional cultural resources	• No change to existing conditions • One National Register-eligible in Area II • No traditional cultural resources on base or in area immediately adjacent to the base
NTTR	
• Noise and sonic booms unlikely to affect archaeological sites or architectural resources • Increase of 1 to 4 sonic booms per month in the airspace units could be considered to affect setting of sacred and traditional use areas, but not adversely	• Existing conditions at 5,000 archaeological sites estimated beneath NTTR airspace would remain unchanged • Over 50 historic mining sites, rock art, traditional use areas, and sacred sites in NTTR would continue to be unchanged

Table 2-18 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	*No-Action Alternative*
HAZARDOUS MATERIALS AND WASTE	
Nellis AFB	
• No change in large quantity generator status • No change to existing management protocols required • Four potential F-35 construction sites may occur above ERP sites, an ERP waiver would be required prior to construction • No new types of hazardous materials would be introduced • F-35 maintenance would generate about 11,664 pounds of RCRA hazardous waste per year, approximately a 6 percent increase	• Nellis AFB would continue to be a large quantity generator • Existing procedures for renovation or demolition activities would continue to be reviewed by Civil Engineering personnel to ensure appropriate measures are taken to reduce potential exposure to, and release of, friable asbestos

3.0 AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

3.1 ANALYSIS APPROACH

NEPA requires focused analysis of the areas and resources potentially affected by an action or alternative. It also provides that an EIS should consider, but not analyze in detail, those areas or resources not potentially affected by the proposal. Therefore, an EIS should not be encyclopedic; rather, it should be succinct and to the point. Both description and analysis in an EIS should provide sufficient detail and depth to ensure that the agency (i.e., Air Force) took a hard look. NEPA also requires a comparative analysis that allows decisionmakers and the public to differentiate among the alternatives. This EIS focuses on those resources that would be affected by the proposed beddown of F-35s at Nellis AFB, Nevada.

CEQ regulations (40 CFR Parts 1500-1508) for NEPA also require an EIS to discuss impacts in proportion to their significance and present only enough discussion of other than significant issues to show why more study is not warranted. The analysis in this EIS considers the current conditions of the affected environment and compares those to conditions that might occur should the Air Force implement either the proposed action or no-action alternative.

3.1.1 Affected Areas

The proposed action includes components affecting Nellis AFB, NTTR, or both. Some components, such as F-35 construction projects, essentially affect only the base due to their limited geographic scope. Although minimal, the proposed changes in personnel would not only affect the base, but its economic and social effects would extend out into the general Las Vegas community. Affected areas for noise generated by airfield operations would include much of the base and lands adjacent to the base. NTTR and its associated airspace forms another affected area with a similar, but distinct set of components. For example, increases in aircraft operations generate more noise at NTTR, just like at Nellis AFB. Similarly, the effects of ordnance delivery are exclusive to NTTR. Table 3.1-1 highlights the affected areas analyzed for each resource.

Table 3.1-1 Resources Analyzed in the Environmental Impact Analysis Process

Resource	*Nellis AFB*	*NTTR*
Airspace and Aircraft Operations	Yes	Yes
Noise (Subsonic and Supersonic)	Yes	Yes
Air Quality	Yes	Yes
Safety	Yes	Yes
Land Use and Recreation	Yes	Yes
Socioeconomics and Infrastructure	Yes	No
Environmental Justice and Protection of Children	Yes	No
Soils and Water Resources	Yes	No
Biological Resources	Yes	Yes
Cultural Resources	Yes	Yes
Hazardous Materials and Waste	Yes	No

3.1.2 Affected Environment and Resources Analyzed

Based on the components of the proposed action and scoping comments, the Air Force defined the environment potentially affected by the F-35 beddown. This definition focused on specific resource categories. As a result of this review, this EIS evaluated 11 resource categories: airspace and aircraft operations; noise; air quality; safety; land use and recreation; socioeconomics and infrastructure; environmental justice and protection of children; soils and water; biological resources; cultural resources; and hazardous materials and waste (see Table 3.1-1). Due to the lack of potential impacts from the proposed action at NTTR (e.g., no construction would occur within NTTR, no increase in personnel at any of the NTTR facilities are anticipated, nor would low income or minority communities be affected by F-35 increased overflights) socioeconomics and infrastructure; environmental justice and protection of children; soils and water resources; and hazardous materials and waste were analyzed only for Nellis AFB. No changes to any of these resources from baseline conditions would occur at NTTR if the proposed action were adopted.

3.1.3 Definition of Baseline

Baseline conditions provide a benchmark against which an agency measures the effects of the proposed action. The differences in the conditions between baseline and proposed actions reflect the magnitude of impacts relative to the various resources analyzed. As such, the EIS must define the baseline conditions and timing.

For the proposed action, establishing baseline conditions is based on the timing of the components of the proposed action. However, the different components of the action—construction, aircraft beddown, operations, and personnel changes—would occur at different times. Since construction would start in 2009, the baseline employed for this component of the action consists of the current configuration and conditions at the base. The analyses for resources affected by construction, therefore, employed current conditions as the baseline. For example, the air quality analysis compared the proposed action construction emissions (2009 through 2014) to current conditions based on best available information.

Under the proposed action, beddown and operation of the F-35 aircraft would occur in four phases between 2012 and 2022. The analysis of airspace operations, safety, noise, and air quality all reflect the inventory and operations of aircraft at the start of this period based on actions authorized by the Air Force and fully analyzed under NEPA. This includes aircraft, such as the F-22A, which would complete their beddown by about 2009. Thus, under baseline conditions, the EIS accounts for effects of the presence and operation of the full compliment of F-22A aircraft even though that number of aircraft is not currently at the base. The analysis addresses personnel changes associated with the proposed action in the same way.

3.2 AIRSPACE AND AIRCRAFT OPERATIONS

The safe, orderly, and compatible use of the nation's airspace is made possible through a system of flight rules and regulations, airspace management actions, and air traffic control procedures just as use of the nation's highway system is governed by traffic laws and rules for operating vehicles. The national airspace system is designed and managed to protect aircraft operations around most airports and along air traffic routes connecting these airports, as well as within special areas where activities such as military flight training are conducted. The FAA has the overall responsibility for managing the airspace system and accomplishes this through close coordination with state aviation and airport planners, military airspace managers, and other entities.

This section describes how the airspace, flight routes, and operating procedures have been designed to accommodate both military training and civil aircraft operations in the affected areas encompassing Nellis AFB and NTTR. Discussions of NTTR include the restricted areas and MOAs supporting Nellis AFB operations. Information was obtained from current aeronautical maps, flight information publications, Nellis AFB documents, and contacts with Air Force and FAA airspace and air traffic control management personnel.

3.2.1 Nellis AFB

Nellis AFB is one of the few military airfields located within the type of airspace (Class B) established around the nation's busiest airports. The outer lateral boundaries of this airspace are shown in Figure 3.2-1. Class B airspace requires all aircraft operating within the lateral and vertical limits of this area to be in communication with and under the positive control of an air traffic control facility to maximize the safe, orderly flow of all aircraft operating within this congested area. Designation of Class B airspace for the Las Vegas area was based on the high density aircraft operations conducted regularly at both Nellis AFB and McCarran International Airport and operations at the other airports in the area, for instance North Las Vegas Air Terminal. In total, over a half million cumulative takeoffs and landings are conducted yearly at Nellis AFB and McCarran.

Departure and arrival flight routes established for each runway direction at Nellis AFB segregate base flight operations from civil air traffic at other local airports and standardize the flow of military flights between the base and NTTR. Two parallel runways (21 Left/03 Right and 21 Right/03 Left [21L/3R and 21R/3L]) are oriented in a northeast-southwest direction (Figure 3.2-2). In general, the flight routes follow both a north-south flow through the "Sally" Corridor portion of the Desert MOA for flights entering/exiting the eastern portion of NTTR (refer to Figure 3.2-1). East-west flow (paralleling Highway 95) is used for entering/exiting western portions of NTTR airspace. These routes contain specific directional and altitude requirements and advisory information that separate inbound/outbound aircraft

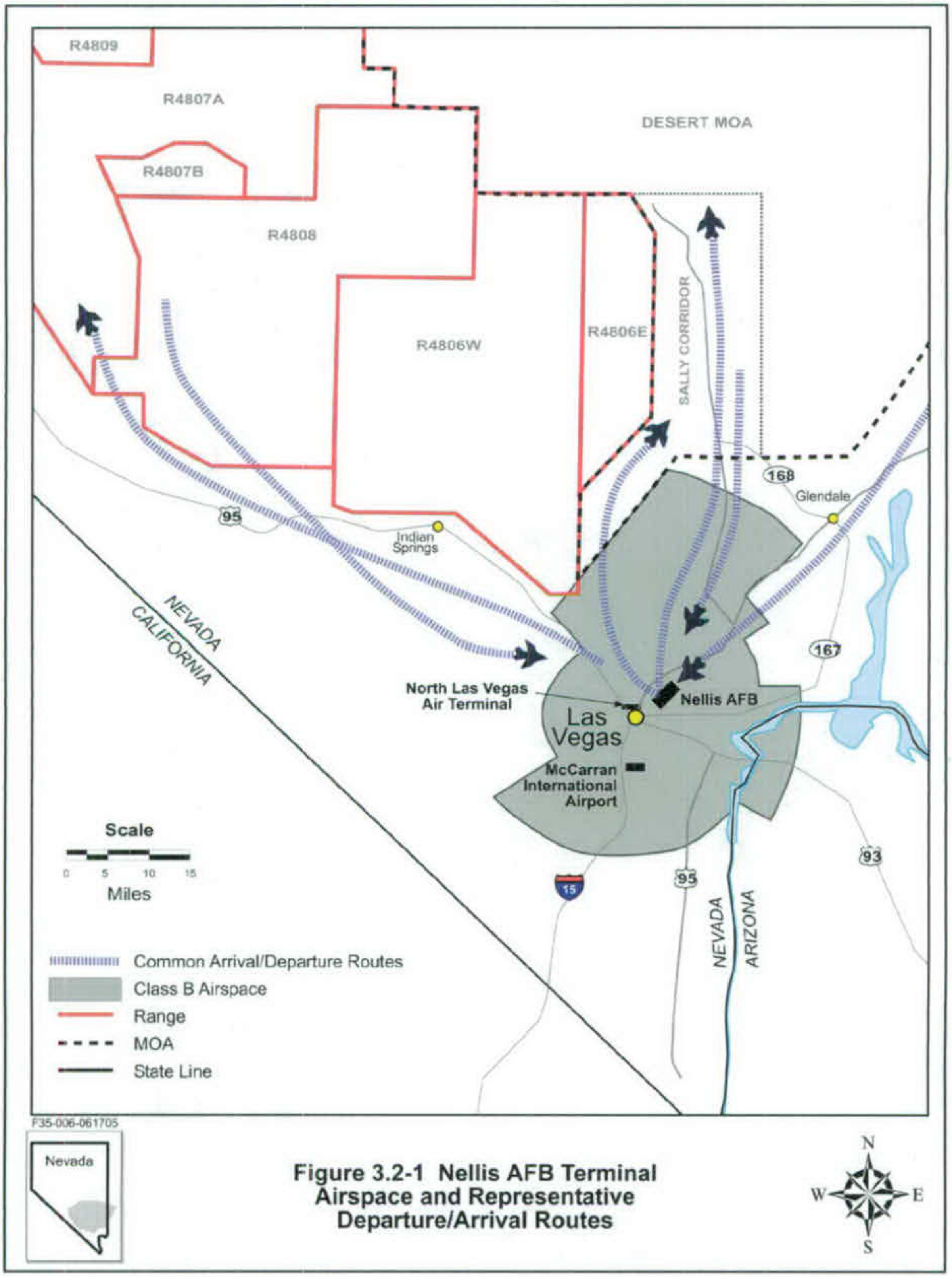
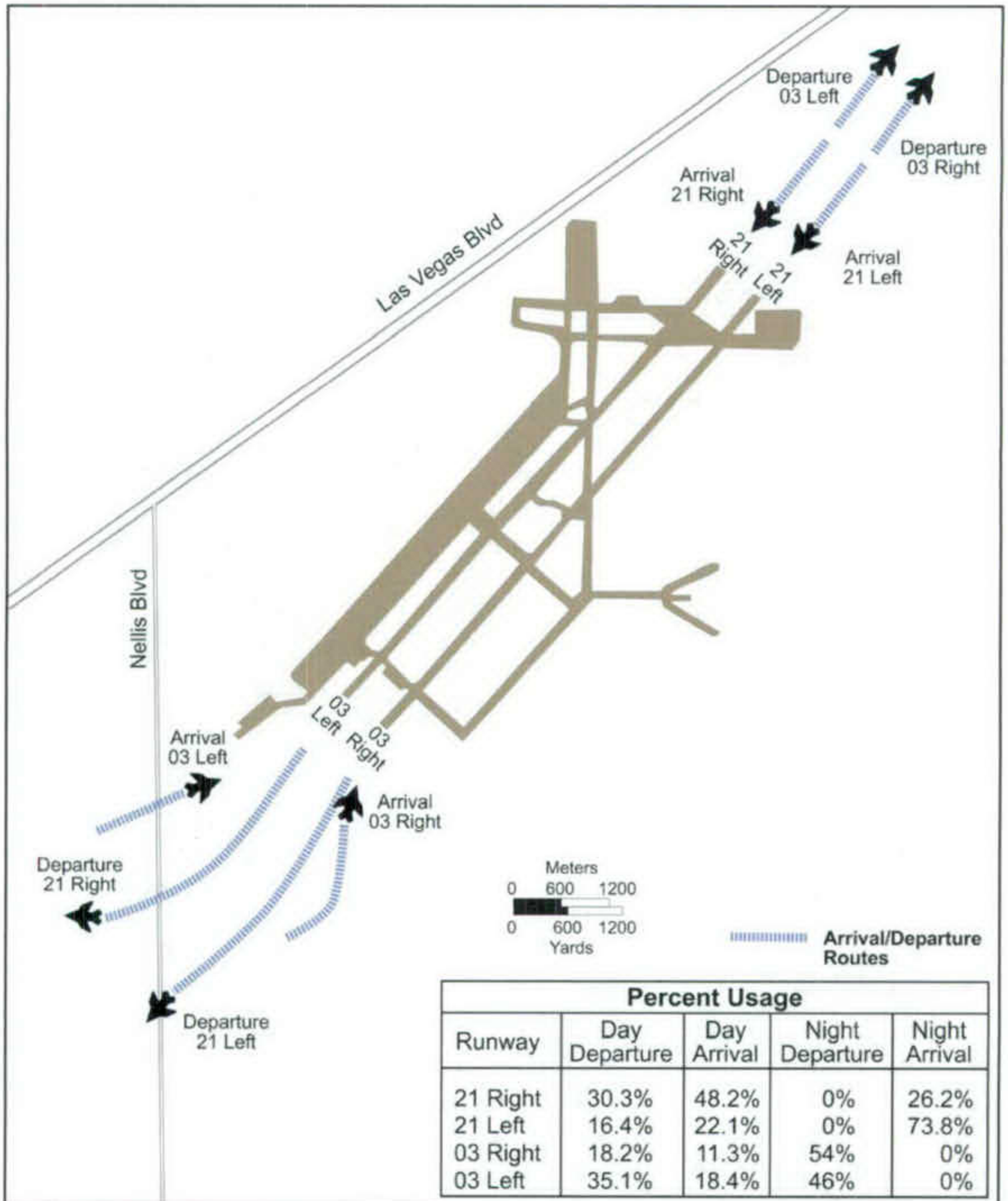


Figure 3.2-1 Nellis AFB Terminal Airspace and Representative Departure/Arrival Routes



Percent Usage				
Runway	Day Departure	Day Arrival	Night Departure	Night Arrival
21 Right	30.3%	48.2%	0%	26.2%
21 Left	16.4%	22.1%	0%	73.8%
03 Right	18.2%	11.3%	54%	0%
03 Left	35.1%	18.4%	46%	0%

Figure 3.2-2 Representative Arrival/ Departure Flight Tracks at Nellis AFB

while minimizing noise impacts on populated areas and maintaining safety buffers from the North Las Vegas Air Terminal and the NTTR training area. Aircraft departing from Nellis AFB expedite their turns and climbs after takeoff for noise abatement and to avoid populated areas around the base.

Factors such as local wind and weather conditions, noise abatement, mission requirements, and emergency conditions are considered for runway selection. Normal weekday daytime operations consist of aircraft departing to both the northeast and the southwest. When departing to the southwest, aircraft make immediate right turns to the north or northwest. Daytime arrivals are generally (70 percent) from the northeast.

All night operations depart to the northeast (03 Right/Left) to reduce aircraft noise effects on residences (see Figure 3.2-2). Inbound traffic follows the same flow to Nellis AFB and are funneled by air traffic control to a point 5 to 10 miles northeast of the base where they proceed straight inbound for landing on Runway 21 (arrival 21 Left/Right).

A summary of Nellis AFB airfield traffic counts since 1987 indicates that annual airfield operations have varied between 61,000 and 181,000 take-offs and landings (Air Force 1999b). There were roughly 85,000 airfield operations (takeoffs and landings) at Nellis AFB in FY02 (Air Force 2004e). The majority of these operations include NTTR arrivals and departures. Of that majority, about 70 percent enter and exit NTTR through the Sally Corridor (Air Force 2004e).

3.2.2 Nevada Test and Training Range

The NTTR consists of the Desert and Reveille MOAs and four restricted areas: R-4806, R-4807, R-4808, and R-4809. All NTTR airspace units support supersonic flight, with portions authorized for flights as low as 100 feet AGL in R-4807 and 5,000 feet AGL in MOAs (refer to Figure 2-3).

The development and use of renewable energy, such as Wind Generated Energy Facilities (WGEF) have become important, and several wind generators can be found in the region around NTTR. Range and airspace personnel at Nellis AFB are aware of the location of these generators and ensure aircrews are also aware of the objects and the potential impacts with regards to safety, electromagnetic interference (EMI) and radar signatures, and operational security.

Low-altitude avoidance and noise-sensitive areas are identified in NTTR flight instructions for various locations within and adjacent to NTTR and FAA rules state that all aircraft must avoid persons, vehicles, and structures by 500 feet. Military pilots are instructed to avoid these locations by horizontal and vertical distances to enhance flight safety, noise abatement, and environmental sensitivity.

As noted in Chapter 2, NTTR baseline sortie-operations range from 200,000 to 300,000 annually. These sortie-operations are dispersed throughout the major airspace units and their subdivisions. Appendix B provides further information about sortie-operations within NTTR airspace.

Restricted Areas

A restricted area is airspace within which flight by non-participating aircraft, while not wholly prohibited, is subject to restriction during scheduled periods when hazardous activities are being performed (14 CFR Part 1.1). Restricted areas designated as "joint use" by the FAA, permit Air Traffic Control (ATC) to route nonparticipating aircraft through this airspace when it is not in use or when appropriate separation can be provided. Restricted areas R-4806 and R-4807 are delegated by the FAA to Nellis AFB for military control and operations, and are designated joint use. R-4808N is delegated to the DOE for those operations supporting NTTR activities and is not joint use, but some of this restricted area is jointly used by both the DOE and aircraft from Nellis AFB. R-4808S is used jointly by DOE below 10,000 feet MSL, Nellis AFB between 11,000 and 27,000 feet MSL, and the FAA at or above 28,000 feet MSL for overflights. With the exception of a portion of R-4806 (which begins at 100 feet AGL), all of these restricted areas extend from the surface up for an unlimited distance into the atmosphere.

R-4806 is used for conventional bombing and gunnery testing and training. Except for the extreme northern portion of this restricted area, all of R-4806 overlies the DNWR. R-4807 replicates an electronic battlefield with numerous simulated tactical targets such as tank convoys, munitions storage and sites, regimental/battery, air defense artillery units, etc. R-4807 is also used for overflights of a land area (Pahute Mesa) used by the DOE as an annex to the NTS. Portions of R-4809 are used jointly by the DOE and the Air Force. R-4809 is normally used by NTTR aircraft in conjunction with R-4807; however, the Tonopah Test Range airfield, located beneath R-4809, can be used as a divert base for in-flight emergencies and other non-routine operations. R-4809 also includes an electronic combat range.

Military Operations Areas

A MOA separates and segregates certain nonhazardous military activities from instrument flight rules aircraft and identifies for visual flight rules aircraft where these activities are conducted. The Desert and Reveille MOAs are used for air-to-air intercept training and abrupt maneuvers that may involve supersonic flight at and above 5,000 feet AGL. The base altitude of these MOAs is 100 feet AGL. Because a MOA has a base altitude of 100 feet AGL, unlike restricted areas which go down to the surface, these areas are only used for air-to-air operations. No bombs are released in the MOAs.

Since a MOA, by definition, only extends up to, but not including, 18,000 feet MSL, ATCAA is provided by the FAA on an as-needed basis to extend training airspace to higher altitudes in accordance with a Letter of Agreement with Nellis AFB.

The Desert MOA/ATCAA comprises the eastern half of NTTR and is normally scheduled and used during daylight hours Monday through Saturday. Any change to this normal schedule is disseminated by a Notice to Airmen (NOTAM) that advises all military and civil pilots of the use status. The Desert MOA/ATCAA is divided into subsections (Caliente, Elgin, and Coyote), which are used individually or in combination for air-to-air training. The Sally Corridor portion of the MOA is the primary transition route between Nellis AFB and most portions of NTTR.

The Reveille MOA/ATCAA is located in the northern portion of NTTR. This airspace is normally controlled by the FAA Salt Lake Air Route Traffic Control Center (ARTCC) when not activated for NTTR use. When needed for military use, the Reveille MOA/ATCAA is scheduled with the ARTCC in advance and instrument flight rules (IFR) civil flights are provided the appropriate IFR separation from military operations.

Since MOA operations are considered nonhazardous, visual flight rules (VFR) pilots may fly through a MOA when it is in use while exercising see-and-avoid clearance precautions. Military pilots are also aware of other aircraft during their maneuvers, both visually and through use of cockpit radar displays, to identify and remain well clear of nonparticipating air traffic that may be operating in the MOA. Depending upon terrain and an aircraft's position and use of transponder equipment (electronic beacon), aircraft radar displays are capable of detecting aircraft within 100 miles, including smaller general aviation aircraft. VFR pilots can obtain MOA use status and radar traffic advisories from Nellis AFB ATC while operating through this airspace.

Military Training Routes

Nellis AFB, 57^{th} Operational Support Squadron is the scheduling unit for two MTRs that lie partially within NTTR airspace, IR-286 and VR-222. These MTRs are not always used in conjunction with NTTR activities and are flown by various aircraft. The annual number of sorties flown on each of these routes is less than one per day.

Civil and Commercial Aviation Airspace Use

Several federal (also known as Victor) airways and jet routes flown by IFR rules border NTTR airspace (Figure 3.2-3) and provide nearly direct routing between key airports in the west and midwest. When air traffic control routes this traffic through NTTR airspace, separation is provided from all military operations. Two public airports or airfields underlie the MOA portions of the NTTR airspace; several airports occur near NTTR. Neither of the two underlying airfields has over 1,000 aircraft operations a year (AirNav 2007). Surrounding airfields range from about 15,000 operations per year at Mesquite to 10 at Lida Junction. These operations are minimal compared to the over 840,000 annual operations at McCarran and North Las Vegas airports (AirNav 2007).

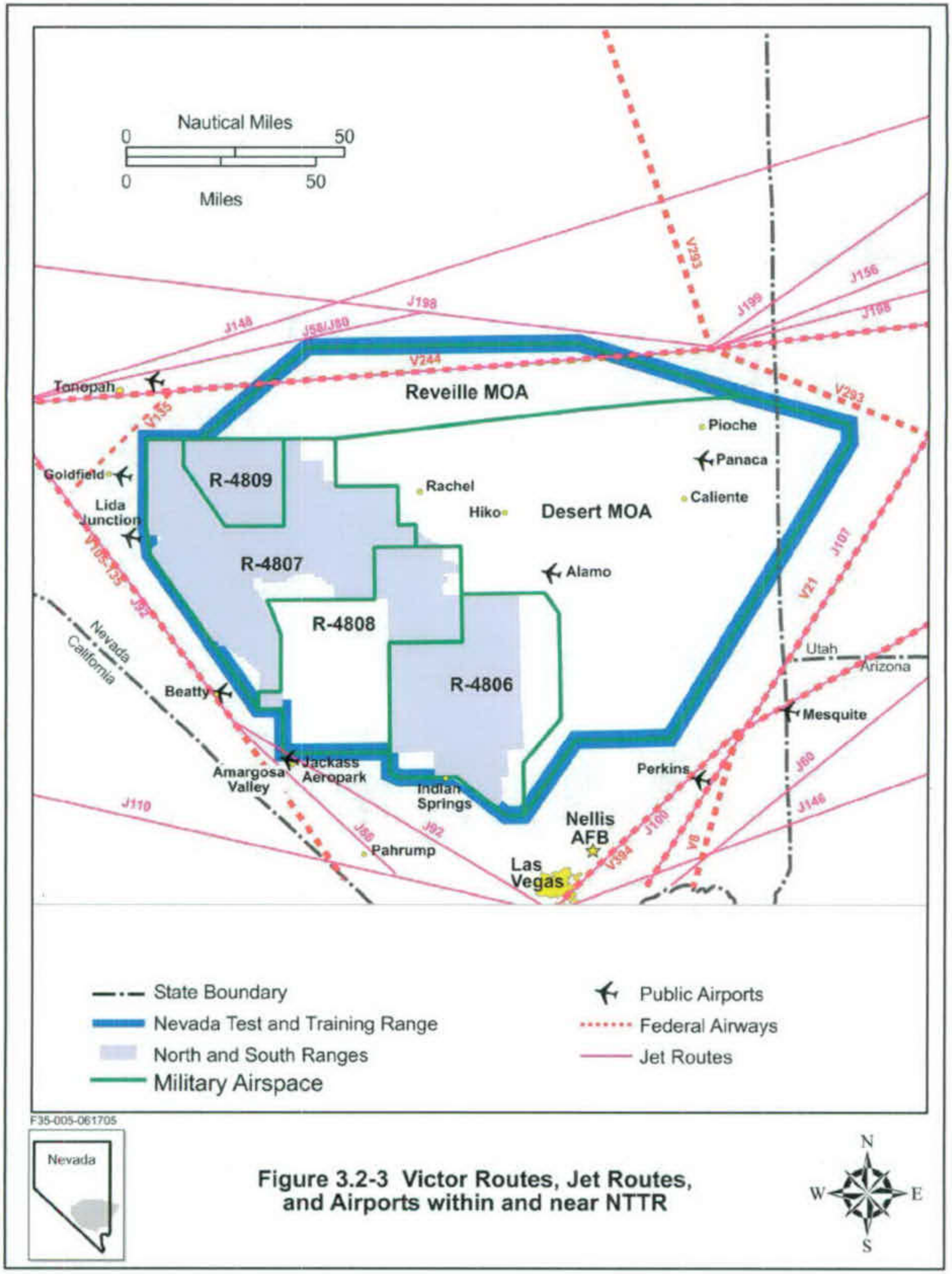


Figure 3.2-3 Victor Routes, Jet Routes, and Airports within and near NTTR

Commercial aircraft activity in Nevada has increased considerably and is expected to continue to grow over the next 20 years (NDOT 2005). Most of this present and anticipated growth is at the Las Vegas and Reno airports. Commercial operations are expected to increase 54 percent; general aviation activity is expected to grow by about 17 percent by 2015 (NDOT 2005); and McCarran Airport should exceed its stated capacity by 2008 (NDOT 2005).

Aircraft operating under VFR between any of the airports in the Las Vegas area or airfields adjacent to NTTR airspace must either remain clear of restricted airspace or may fly through the Desert and Reveille MOAs. Nellis AFB operations/airspace representatives provide periodic briefings to area civil aviation pilots on military aircraft operations as part of the ongoing Midair Collision Avoidance Program.

The USFWS conducts periodic flights in the DNWR for aerial census and tracking of bighorn sheep and maintenance of water facilities. These flights occur during the spring and fall, about three to five times a year, and are coordinated through the Nellis AFB range control and scheduling functions (personal communication, Schofield 2005).

3.3 NOISE

The effect of aircraft noise from the F-35 beddown was one of the most predominant questions expressed during scoping. Concerns regarding aircraft noise related to certain potential impacts such as hearing loss, non-auditory health effects, annoyance, speech and sleep interference, and effects on animals and wildlife, structures, terrain, and historical and archaeological sites. Noise levels from aircraft in residential areas near Nellis AFB and the potential for sonic booms in NTTR were also common concerns.

Noise is often defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, diminishes the quality of the environment, or is otherwise annoying. Response to noise varies by the type and characteristics of the noise source, distance between source and receptor, receptor sensitivity, and time of day. Noise may be intermittent or continuous, steady or impulsive, and may be generated by stationary or mobile sources. Although aircraft are not the only source of noise in any area, they are readily identifiable to those affected by their noise emissions and are routinely singled out for special attention and criticism.

There are two kinds of noise discussed in this EIS. The first is conventional subsonic noise, as generated by an aircraft's engines and airframe. This is the most familiar form of aircraft noise, and is heard while an aircraft is within some distance of a receiver. The second type of noise is supersonic. Sonic booms are brief impulsive sounds, which are generated by the aircraft when it flies faster than sound. Supersonic flight by many different types of aircraft occurs regularly within approved NTTR airspace.

Assessment of subsonic and supersonic aircraft noise requires a general understanding of the measurement and effects of these two kinds of noise. Appendix C contains additional discussion of noise, the quantities used to describe it, and its effects. Refer to Appendix C for explanations of concepts that are briefly defined in this section.

Noise represents the most identifiable concern associated with aircraft operations. Although communities and even isolated areas receive more consistent noise from other sources (e.g., cars, trains, construction equipment, stereos, wind), the noise generated by aircraft overflights often receives the greatest attention. General patterns concerning the perception and effect of aircraft noise have been identified, but attitudes of individual people toward noise are subjective and depend on their situation when exposed to noise. Annoyance is the primary consequence of aircraft noise. The subjective impression of noise and the disturbance of activities are believed to contribute significantly to the general annoyance response. A number of nonnoise related factors have been identified that may influence the annoyance response of an individual. These factors include both physical and emotional variables.

Personal opinions on noise vary widely. For example, one person might consider rock music as pleasing but opera music as offensive. A second person may perceive just the opposite. Likewise, opinions on noise associated with military overflights vary from positive to negative.

Aircraft Noise Assessment Methods

An assessment of subsonic and supersonic aircraft noise requires a general understanding of how sound is measured and how it affects people and the natural environment. While Appendix C provides a detailed discussion of noise and its effects on people and the environment, the primary information needed to understand the noise analysis is summarized below.

Noise is represented by a variety of quantities, or "metrics." Each noise metric was developed to account for the type of noise and the nature of what (i.e., receptor) may be exposed to the noise. Human hearing is more sensitive to medium and high frequencies than to low and very high frequencies, so it is common to use "A-weighted" metrics, which account for this sensitivity. Impact of impulsive supersonic noise depends on factors other than human hearing, so that is often quantified by "C-weighted" metrics.

Different time periods also play a role with regard to noise. People hear the sound that occurs at a given time, so it is intuitive to think of the instantaneous noise level, or perhaps the maximum level that occurs during an aircraft flyover. However, the effects of noise over a period of time depends on the total noise exposure over extended periods, so "cumulative" noise metrics are used to assess the impact of ongoing activities such as those that occur at Nellis AFB and NTTR.

Within this EIS, noise is described by the sound level (L), the Sound Exposure Level (SEL), Day-Night Average Sound Level (DNL), and Onset Rate-Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}). A-weighted levels are used for subsonic aircraft noise, and C-weighted levels are used for supersonic aircraft noise (sonic booms) and other impulsive noises. A "C" is included in the symbol to denote when C-weighting is used. Each of these metrics is summarized below and discussed in more detail in Appendix C.

- Sound Level is the amplitude (level) of the sound that occurs at any given time. When an aircraft flies by, the level changes continuously, starting at the ambient (background) level, increasing to a maximum as the aircraft passes closest to the receiver, then decreases to ambient as the aircraft flies into the distance. Sound levels occur on a logarithmic decibel scale; a sound level that is 10 decibels (dB) louder than another will be perceived as twice as loud.
- Sound Exposure Level accounts for both the maximum sound level and the length of time a sound lasts. SEL does not directly represent the sound level heard at any given time, but rather provides a measure of the total sound exposure for an entire event.
- Day-Night Average Sound Level is a noise metric combining the levels and durations of noise events, and the number of events over a 24-hour time period. It is a cumulative average,

computed over a given time period like a year, to represent total noise exposure. DNL also accounts for more intrusive nighttime noise, adding a 10-dB penalty for sounds after 10:00 p.m. and before 7:00 a.m. DNL is the measure used to appropriately account for total aircraft noise exposure around airfields such as Nellis AFB.

- Onset Rate Adjusted Monthly Day-Night Average Sound Level is the measure used for subsonic aircraft noise in military airspace like NTTR. L_{dnmr} accounts for the fact that when military aircraft fly low and fast, the sound can rise from ambient to its maximum very quickly. Known as an onset-rate, this effect can make noise seem louder than its actual level. Penalties of up to 11 dB are added to account for this onset rate.
- C-Weighted Day-Night Average Sound Level (CDNL) is the day-night sound level computed for areas subject to sonic booms, such as portions of NTTR. These areas are also subjected to subsonic noise assessed according to L_{dnmr}.

Assessing Aircraft Noise Effects

Aircraft noise effects can be described according to two categories: annoyance and human health considerations. Annoyance, which is based on a perception, represents the primary effect associated with aircraft noise. Far less potential exists for effects on human health. Studies of community annoyance to numerous types of environmental noise show that DNL correlates well with effects. Schultz (1978) showed a consistent relationship between noise levels and annoyance. In 1991, a study reaffirmed this relationship (Fidell *et al.* 1991) and in 1994, Finegold updated the form of the curve fit and compared it with the original Schultz curve (Finegold *et al.* 1994). The updated fit, which does not differ substantially from the original, is the current preferred form (see Appendix C).

In general, there is a high correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL. The correlation is lower for the annoyance of individuals. This is not surprising considering the varying personal factors that influence the manner in which individuals react to noise. The inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using DNL.

In addition to annoyance, other factors that can be used to evaluate a noise environment are noise-induced hearing loss, speech

Factors Influencing Annoyance
Physical Variables
• Type of neighborhood • Time of day • Season • Predictability of noise • Control over the noise source • Length of time an individual is exposed to a noise
Emotional Variables
• Feelings about the necessity or preventability of the noise • Judgment of the importance and value of the activity that is producing the noise • Activity at the time an individual hears the noise (conversation, sleep, recreation) • Attitude about the environment • General sensitivity to noise • Belief about the effect of noise on health • Feeling of fear associated with the noise

interference, and sleep disturbance. Effects on speech and sleep also contribute to annoyance. A considerable amount of data on hearing loss has been collected and analyzed. It is well established that continuous exposure to high noise levels (like in a factory) will damage human hearing (USEPA 1974). Hearing loss is generally interpreted as the shifting to a higher sound level of the ear's sensitivity to perceive or hear sound (sound must be louder to be heard). This change can be either temporary or permanent.

Studies on community hearing loss from exposure to aircraft flyovers near airports showed that there is no danger, under normal circumstances, of hearing loss due to aircraft noise (Newman and Bettie 1985). Airport traffic is much more continuous, frequent, and commonly lower in altitude than flights in restricted airspace or MOAs. In this special use airspace, military aircraft fly at varied altitudes, rarely fly over the same point on the ground repeatedly during a short period, and occur sporadically over a day. These factors make it unlikely that an increase in hearing loss would occur under special use airspace (Thompson 1997).

Another nonauditory effect of noise is disruption of conversations. Speech interference associated with aircraft noise is a primary cause of annoyance to individuals on the ground. Aircraft noise can also disrupt routine activities, such as radio listening or television watching and telephone use. Due to the sporadic nature of flights within restricted airspace and MOAs, the disruption generally lasts only a few seconds and almost always less than 10 seconds. It is difficult to predict speech intelligibility during an individual event, such as a flyover, because people automatically raise their voices as background noise increases. A study (Pearsons *et al.* 1977) suggests that people can communicate acceptably in background A-weighted noise levels of 80 dB. The study further indicates that people begin to raise their voices when noise levels exceed 45 dB and some speech interference occurs when background noise levels exceed 65 dB. Typical insulation reduces the noise levels within the home by 20 dB or more and decreases speech interference (U.S. Department of Housing and Urban Development 1991). However, it is recognized that some aircraft flyovers can momentarily interrupt speech communication.

Noise-related awakenings form another issue associated with aircraft noise. Sleep is not a continuous, uniform condition but a complex series of states through which the brain progresses in a cyclical pattern. Arousal from sleep is a function of a number of factors including age, gender, sleep stage, noise level, frequency of noise occurrences, noise quality, and presleep activity. Quality sleep is recognized as a factor in good health. Although considerable progress has been made in understanding and quantifying noise-induced annoyance in communities, quantitative understanding of noise-induced sleep disturbance is less advanced.

A study of the effects of nighttime noise exposure on the in-home sleep of residents near a military airbase, near a civil airport, and in several households with negligible nighttime aircraft noise exposure, revealed SEL as the best noise metric predicting noise-related awakenings. It also determined that out of

930 subject nights, the average spontaneous (not noise-related) awakenings per night was 2.07 compared to the average number of noise-related awakenings per night of 0.24 (Finegold *et al.* 1994). Additionally, a 1995 analysis of sleep disturbance studies conducted both in the laboratory environment and in the field (in the sleeping quarters of homes) showed that when measuring awakening to noise, a 10-dB increase in SEL was associated with only an 8 percent increase in the probability of awakening in the laboratory studies, but only a 1 percent increase in the field (Pearsons *et al.* 1995). Pearsons also reports that even SEL values as high as 85 dB produced no awakenings or arousals in at least one study. This observation suggests a strong influence of habituation on susceptibility to noise-induced sleep disturbance. A 1984 study (Kryter 1984) indicates that an indoor SEL of 65 dB or lower should awaken less than 5 percent of exposed individuals.

To date, no exact quantitative dose-response relationship exists for noise-related sleep interference; yet, based on studies conducted to date and the USEPA guideline of a 45 dB (DNL) to protect sleep interference, useful ways to assess sleep interference have emerged. If homes are conservatively estimated to have a 20-dB noise alleviation, an average of 65 DNL would produce an indoor level of 45 DNL and would form a reasonable guideline for evaluating sleep interference. This also corresponds well to the general guideline for assessing speech interference. Annoyance that may result from sleep disturbance is accounted for in the calculation of DNL, which includes the 10-dB penalty for each sortie occurring after 10:00 p.m. or before 7:00 a.m.

The potential for noise to affect physiological health, such as the cardiovascular system, has been speculated; however, no unequivocal evidence exists to support such claims (Harris 1997). Conclusions drawn from a review of health effect studies involving military low-altitude flight noise with its unusually high maximum levels and rapid rise in sound level have shown no increase in cardiovascular disease (Schwartze and Thompson 1993). Additionally, claims about overflight noise producing increased mortality rates and increases in cardiovascular death, adverse effects on the learning ability of middle- and low-aptitude students, aggravation of post-traumatic stress syndrome, increased stress, increase in admissions to mental hospitals, and adverse affects on pregnant women and the unborn fetus are similarly unsupported (Harris 1997).

Affected Environment

Federal, state, and local governments regulate noise to prevent noise sources from affecting noise-sensitive areas, such as residences, hospitals, and schools, and to protect human health and welfare. Both the Nevada Department of Transportation (NDOT) and the Federal Highway Administration require noise control devices such as sound walls when new highway projects generate sound levels that adversely affect sensitive land uses. Federal agencies, such as the Department of Housing and Urban Development, have established health-based maximum noise exposure recommendations. Local agencies, including cities and counties, are responsible for defining and enforcing land use compatibility in various noise environments. The Air Installation Compatible Use Zone (AICUZ) program is the Air Force's vehicle for presenting their noise environment at airfields such as Nellis AFB (Air Force 2004e).

The AICUZ program at Nellis AFB promotes compatible land development in areas subject to aircraft noise and accident potential. Clark County has incorporated the AICUZ recommendations as an integral part of their comprehensive planning process and are regulated in the Clark County Unified Development Code, Title 30, Section 30.48, Part A, *Airport Environs Overlay District*, dated June 21, 2000, under the authority of Chapter 278, Planning and Zoning, of the Nevada Revised Statutes. Noise compatibility and airport environs implementing standards have also been adopted in the Clark County *Public Health and Safety Programs: Airport Environs Plan*, an amendment of the Clark County Comprehensive Plan (Air Force 1998a).

AICUZ noise contours were developed using the following data: aircraft types, runway utilization patterns, engine power settings, altitude profiles, flight track locations, airspeed, number of operations per flight track, engine maintenance, and time of day. These data were based on a representative day of airfield activity, evaluated over a 24-hour period, when the airfield is in full operation. The advantage of this approach is that it is unaffected by daily, monthly, and yearly fluctuations in the tempo (rate) of use by individual aircraft at the base. The AICUZ study at Nellis AFB employed the NOISEMAP computer-aided modeling approach which is the Air Force's approved program to model subsonic aircraft noise.

3.3.1 Nellis AFB

Sound levels from flight operations at Nellis AFB exceeding ambient background noise typically occur beneath main approach and departure corridors and in areas immediately adjacent to aircraft parking ramps and staging areas. As aircraft take off and gain altitude, their contribution to the noise environment drops to levels indistinguishable from the ambient background. The altitude at which the noise becomes indistinguishable varies depending on the aircraft and meteorological conditions.

The 2004 Nellis AFB AICUZ study identified baseline noise levels ranging from 65 DNL to greater than 80 DNL for the lands encompassing Nellis AFB; this analysis also considered noise levels of 85 DNL and greater (Figure 3.3-1). All lands affected by greater than 85 DNL occur within Nellis AFB, with most of the area affected by 75 to 85 DNL also on base (Table 3.3-1). For off-base areas, noise levels range from 65 DNL to greater than 80 DNL. The noise contours used in this section and Chapter 4.3 for baseline conditions to compare noise impacts are described in the 2004 Nellis AFB AICUZ Report (Air Force 2004e). These contours reflect the most up-to-date data using actual F-22A flight information as well as consideration of recent efforts to reduce noise in the vicinity of Nellis AFB. Total acreage of areas affected by these noise levels is shown in Table 3.3-1.

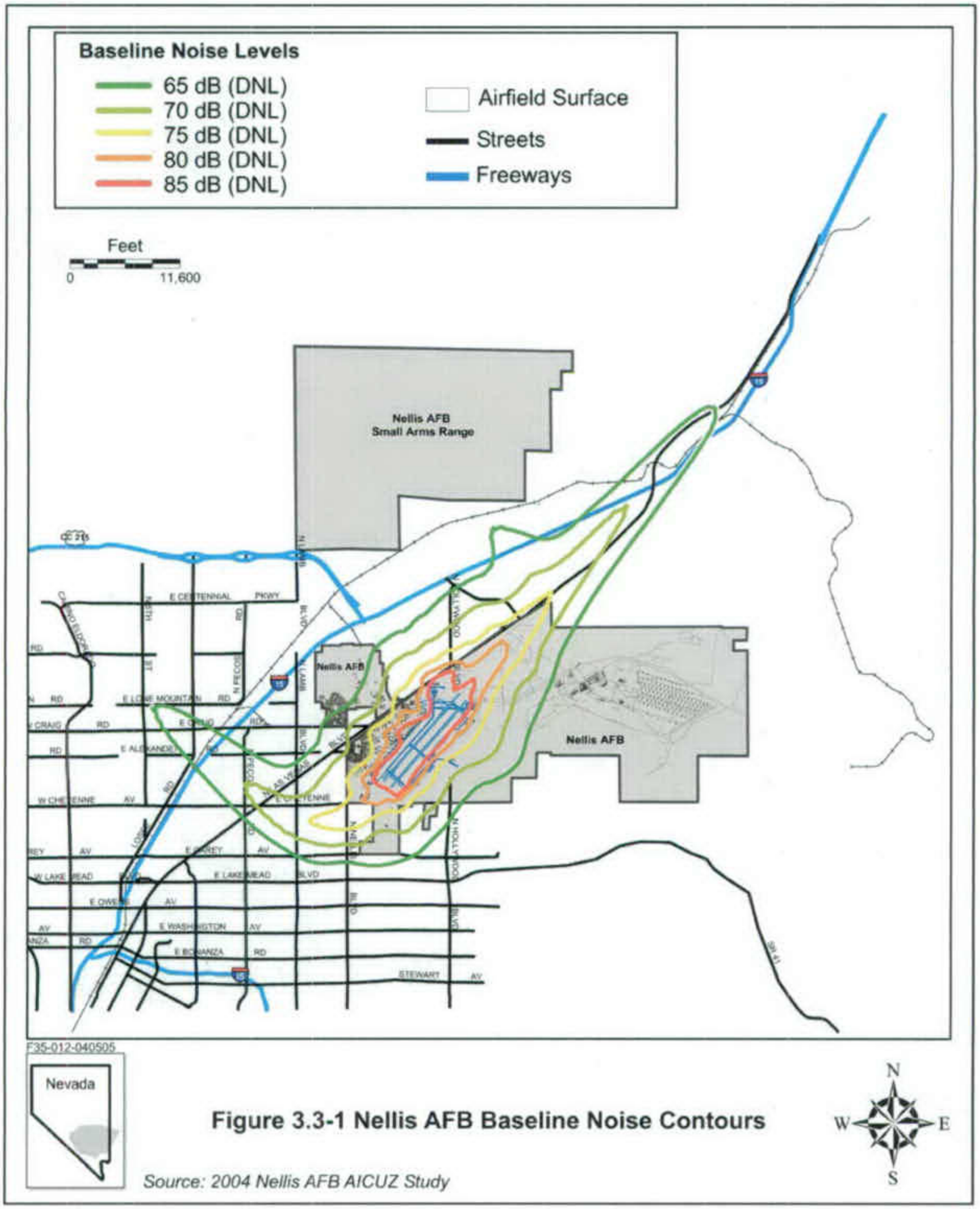


Figure 3.3-1 Nellis AFB Baseline Noise Contours

Source: 2004 Nellis AFB AICUZ Study

Table 3.3-1 Baseline Noise (DNL) Contours for Nellis AFB and Environs*						
	65-70	***70-75***	***75-80***	***80-85***	***>85***	***Total***
Total Acres	8,882	4,787	2,202	1,066	1,161	18,098
Acres within Nellis AFB	1,819	1,540	1,474	1,004	1,161	6,998
Acres outside Nellis AFB	7,063	3,247	728	62	0	11,100
Percent inside Nellis AFB	20%	32%	67%	94%	100%	39%

**Note: In Chapters 3.6 and 4.6, Land Use, a different set of contours are used for comparing impacts to land use and zoning (also published in the 2004 AICUZ study) because these contours are used by Clark County for their land zoning purposes.*

Currently, no noise levels exceeding 85 DNL fall outside of base boundaries and 94 percent of the acreage (i.e., 1,004 out of 1,066) within the 80 to 85 DNL contour, falls within the base. The majority of acres within the 65 to 80 DNL contours are found outside Nellis AFB boundaries.

To reduce noise over off-base residential areas, Nellis AFB applies the following noise abatement procedures (Air Force 2005c):

1. Night flying – Nellis AFB restricts nighttime flying activities and routes to have the least effect on populated areas.
2. Altitude restrictions – Approach and departure procedures are modified to increase altitude at various points along the arrival and departure paths.
3. Northbound take-offs – To the extent possible, northbound departures are used during evening hours (10 p.m. until 8 a.m.) and for all aircraft carrying live ordnance.
4. Afterburner take-offs – No unrestricted afterburner take-offs on weekends or holidays, or before 10 a.m. on weekdays. There are limited exceptions for operational missions and essential testing and training.
5. Practice approaches – Jet aircraft practice approaches are authorized only after 9 a.m. daily.

To the maximum extent possible, engine runup locations have been established in areas that minimize noise for those in the surrounding communities, as well as for people on base. Normal base operations do not include late-night (after 10 p.m.) engine runups, but heavy work loads or unforeseen contingencies sometimes require a limited number of these.

3.3.2 Nevada Test and Training Range

Definition of aircraft noise levels in an airspace environment requires two sets of data. The first is a quantitative understanding of aircraft operations: numbers of aircraft, their speeds, altitudes, and locations. The second set of data derives from the physical modeling of the noise itself, which is then accumulated for all aircraft operations. Aircraft operations (defined as sortie-operations) in NTTR have been described in Chapter 2 and presented in Appendix B. Baseline activity varies from year between 200,000 (low) and 300,000 (high) sortie-operation scenarios, so the noise generated by both was analyzed.

Noise analysis requires data defining aircraft activity in terms of time in NTTR airspace, as well as the speed, altitude, power setting, and position information. One source of data for this information derives from the NTTR airspace manager, who maintains records on the use of NTTR airspace units. A second data source, which tracks aircraft, was also analyzed. Activity during Red Flag exercises and other test/training exercises is recorded for up to 100 aircraft simultaneously by the NACTS which records specific flight parameter data for each aircraft. NACTS was preceded by the Red Flag Measurement and Debriefing System (RFMDS) and the ACMI, both of which provided similar but less robust data. Six months of ACMI data were analyzed as part of a sonic boom monitoring study in the Elgin MOA (Frampton *et al.* 1993a). The implications of these data were incorporated into the BOOMAP 96 sonic boom model (Plotkin 1996, Frampton *et al.* 1993b) and applied in this EIS analysis in order to evaluate the number, nature, and location of sonic booms within NTTR airspace.

Within MOAs and restricted airspace, subsonic flight often occurs randomly, or, due to either airspace configuration or training scenarios, it may be concentrated, or channeled, into specific areas or corridors. The Air Force has developed the MR_NMAP (MOA-Route NOISEMAP) computer program (Lucas and Calamia 1996) to calculate subsonic aircraft noise in these areas. MR_NMAP can calculate noise for both random operations and those channeled into MTRs. It is supported by measurements in several military airspaces (Lucas *et al.* 1995, Frampton *et al.* 1993c).

NTTR includes MOAs and restricted airspace in which random aircraft operation is the norm. There are MTRs in the region, but for the most part these exist outside of the airspace overlying NTTR. Therefore, the noise levels associated with these routes (outside NTTR airspace) are not specifically considered. Operations on route segments that are within NTTR are included in the total noise analysis.

The primary noise metric calculated by MR_NMAP for this assessment is L_{dnmr}. L_{dnmr} has been computed for each of the six airspace units potentially affected by the proposed action and no-action alternative. As discussed above and in Appendix C, this cumulative metric represents the most widely accepted method of quantifying noise impact. However, it does not provide an intuitive description of the noise environment. People often desire to know what the loudness of an individual aircraft will be; MR_NMAP and its supporting programs can provide the SEL for individual aircraft at various distances. Figure 3.3-2 shows the SEL noise levels for various aircraft at 1,000 feet AGL.

Figure 3.3-3 and Table 3.3-2 present the baseline noise levels for NTTR airspace units described in Section 3.1; cumulative noise levels are all below 65 L_{dnmr}. These baseline noise levels are based on using the F-22A engine parameters and differ slightly from those presented in the F-22 FDE EIS (Air Force 1999a). This difference is due to using the actual F-119 engine for the F-22A in this analysis, but in the F-22 FDE EIS, the Air Force applied the best available data available at that time which was an F-18 surrogate—the noise levels for the F-119 operational engines were not yet developed.

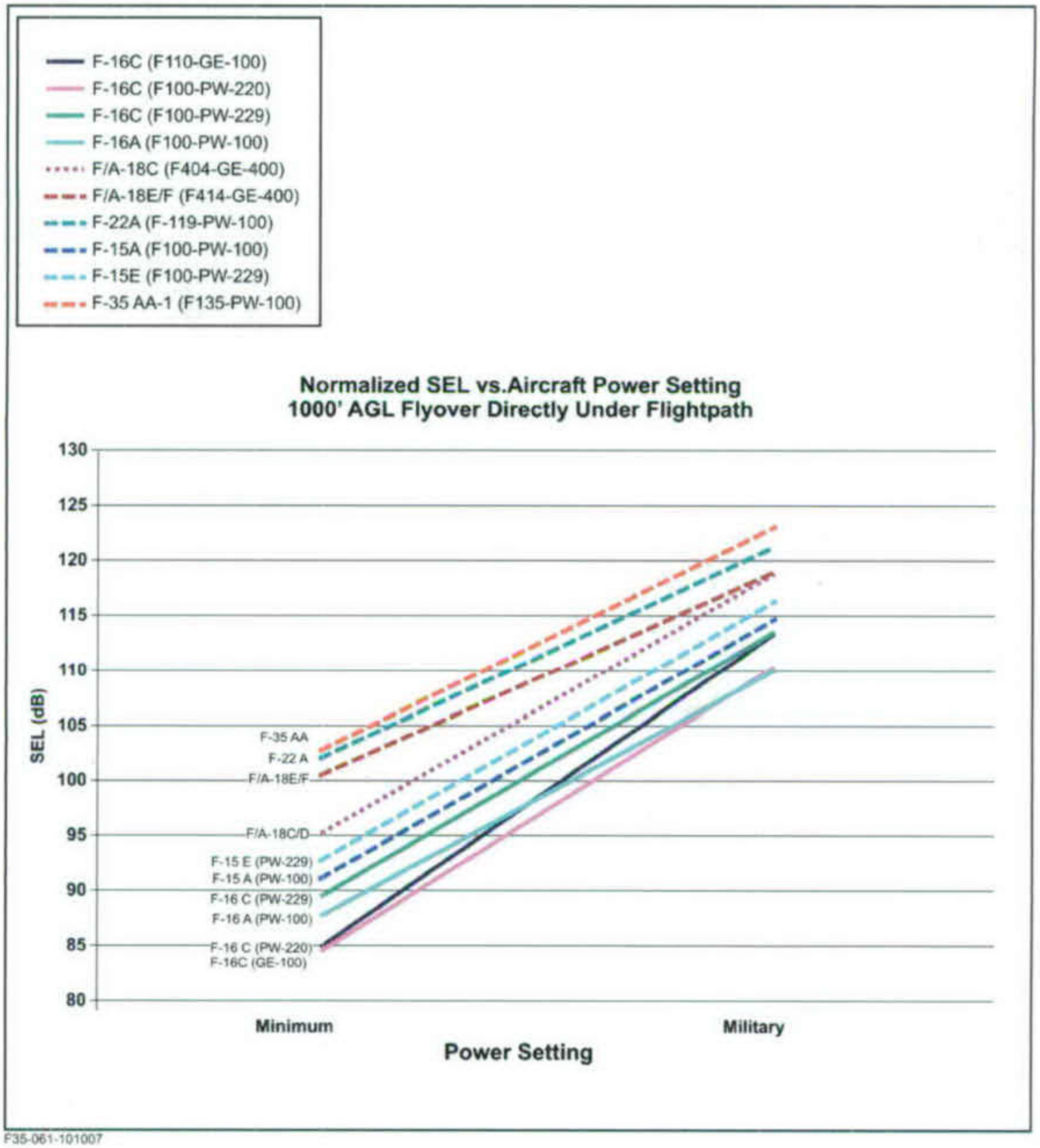


Figure 3.3-2 SEL for Various Aircraft

Source: U.S. Airforce F-35 Joint Program, 2007

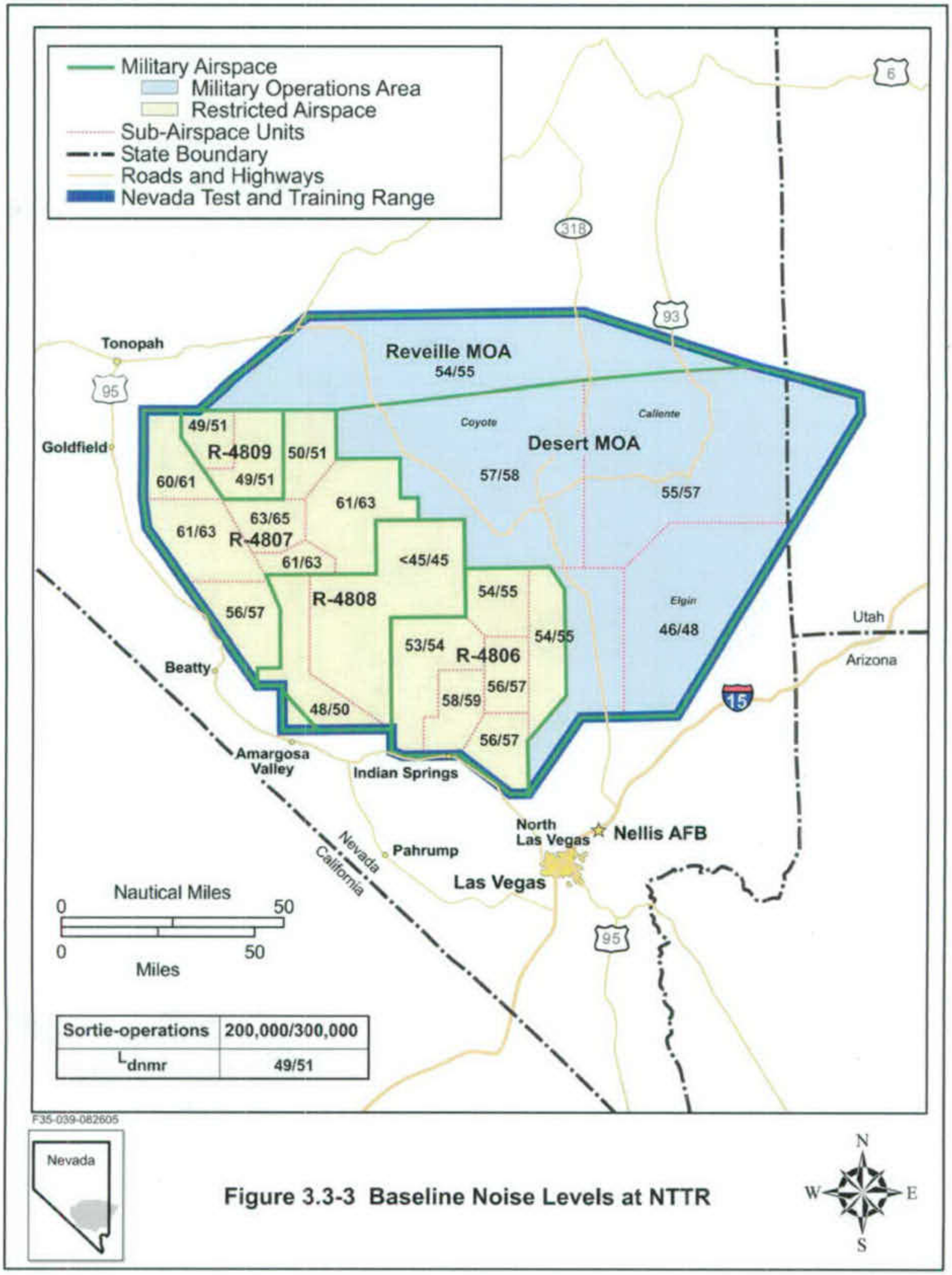


Figure 3.3-3 Baseline Noise Levels at NTTR

Table 3.3-2 Baseline Noise Levels (L_{dnmr}) for NTTR		
Airspace Unit	***Baseline- F-22A FDE Sortie-Operations***	
	200,000	*300,000*
Caliente	55	57
Coyote	57	58
Elgin	46	48
Reveille	54	55
4806R61	54	55
4806R62	56	57
4806R63	56	57
4806R64	53	54
4806R65	58	59
Alamo	54	55
EC South	56	57
Pahute	61	63
4807R71	60	61
4807R74	61	63
4807R75	63	65
4807R76	61	63
4809A	49	51
EC East	50	51
EC West	49	51
4808W	48	50
4808E	<45	45

Some high performance aircraft using NTTR may fly supersonic while training for ACM. The shape and sound of a sonic boom, resulting from supersonic flight, depends on an aircraft's size, weight, geometry, flight altitude, Mach number (i.e., speed), and maneuvering. When comparing the sonic boom from two aircraft, differences in booms are related to variations in size, weight, and geometry. Aircraft exceeding Mach 1 always create a sonic boom; however, not all supersonic flight activities will cause a boom at the ground. As altitude increases, air temperature decreases, and these layers of temperature change cause booms to be turned upward as they travel toward the ground. Depending on the altitude of the aircraft and the Mach number, many sonic booms are bent upward sufficiently that they never reach the ground. This same phenomenon, referred to as "cutoff," also acts to limit the width (area covered) of the sonic booms that reach the ground.

When this sonic boom reaches the ground, it is manifested as an overpressure and is sensed as a sonic boom. A sonic boom is characterized as a rapid rise in pressure, followed by a rapid drop-off before the pressure returns to normal atmospheric levels. This change occurs rapidly (i.e., in significantly less than one second). The overpressures created are, in the vast majority of cases, well below those that would begin to cause physical injury or structure damage. In rare cases, a sonic boom could cause physical damage, as to a window, if the overpressure is of sufficient magnitude. During scoping, members of the public have commented that sonic booms may cause startle effects in humans and animals, resulting in safety issues. The Air Force has established procedures for documenting such cases, and for working with affected parties.

Sonic booms from ACM activity have an elliptical pattern. Aircraft will set-up at positions up to 100 nm apart, then proceed toward each other for an engagement. The airspace used tends to be aligned, connecting the setup points in an elliptical shape. Aircraft will fly supersonic at various times during an engagement exercise. Supersonic events can occur as the aircraft accelerate toward each other, during dives in the engagement itself, and during disengagement. The long-term average (CDNL) sonic boom patterns also tend to be elliptical.

Long-term sonic boom measurement projects have been conducted in four airspace: White Sands Missile Range (Plotkin *et al.* 1989), the eastern portion of the Goldwater Range (Plotkin *et al.* 1992a), the Elgin MOA at NTTR (Frampton *et al.* 1993a), and the western portion of the Goldwater Range (Page *et al.* 1994). These seminal studies included analysis of schedule and ACMI data and they supported development of the 1992 BOOMAP model (Plotkin *et al.* 1992b). The current version of BOOMAP (Plotkin 1996, Frampton *et al.* 1993b) incorporates results from all four studies.

A variety of aircraft conducting testing and training perform flight activities that include supersonic events. Predominately, these events occur during air-to-air combat, often at high altitudes. Roughly 3 to 10 percent of ACM flight activities, depending upon aircraft type, result in supersonic events within the approved airspace in NTTR (Frampton *et al.* 1993b).

Figure 3.3-4 and Table 3.3-3 show baseline supersonic noise levels (CDNL) and sonic booms, per month, in affected airspace. This airspace includes all of the Reveille MOA and the other airspace units authorized for supersonic flight activity. These consist of the northern portion of Desert MOA (which includes subunits of Elgin and Coyote MOAs) and other surrounding restricted airspace (subunits of R-4807 that include R-74 and EC East) used for ACM training and air battles as part of flag exercises. As with subsonic noise, levels below 45 CDNL are not shown. The values pertain to only those airspace units where supersonic flight is allowed. Appendix C provides further discussion of sonic booms and their effects.

Table 3.3-3 Baseline Supersonic Noise Levels (CDNL) and Sonic Booms

Airspace Unit	*200,000 Sortie-Operations*		*300,000 Sortie-Operations*	
	CDNL	*Booms per month*	*CDNL*	*Booms per month*
Elgin	55	24	57	35
Coyote	51	10	52	12
Reveille	45	2	45	2
EC East	45	2	46	2
EC South	<45	<2	<45	<2
Pahute	<45	<2	<45	<2
R71	<45	<2	<45	<2
R74	45	2	46	2
R75	<45	<2	<45	<2
R76	<45	<2	<45	<2

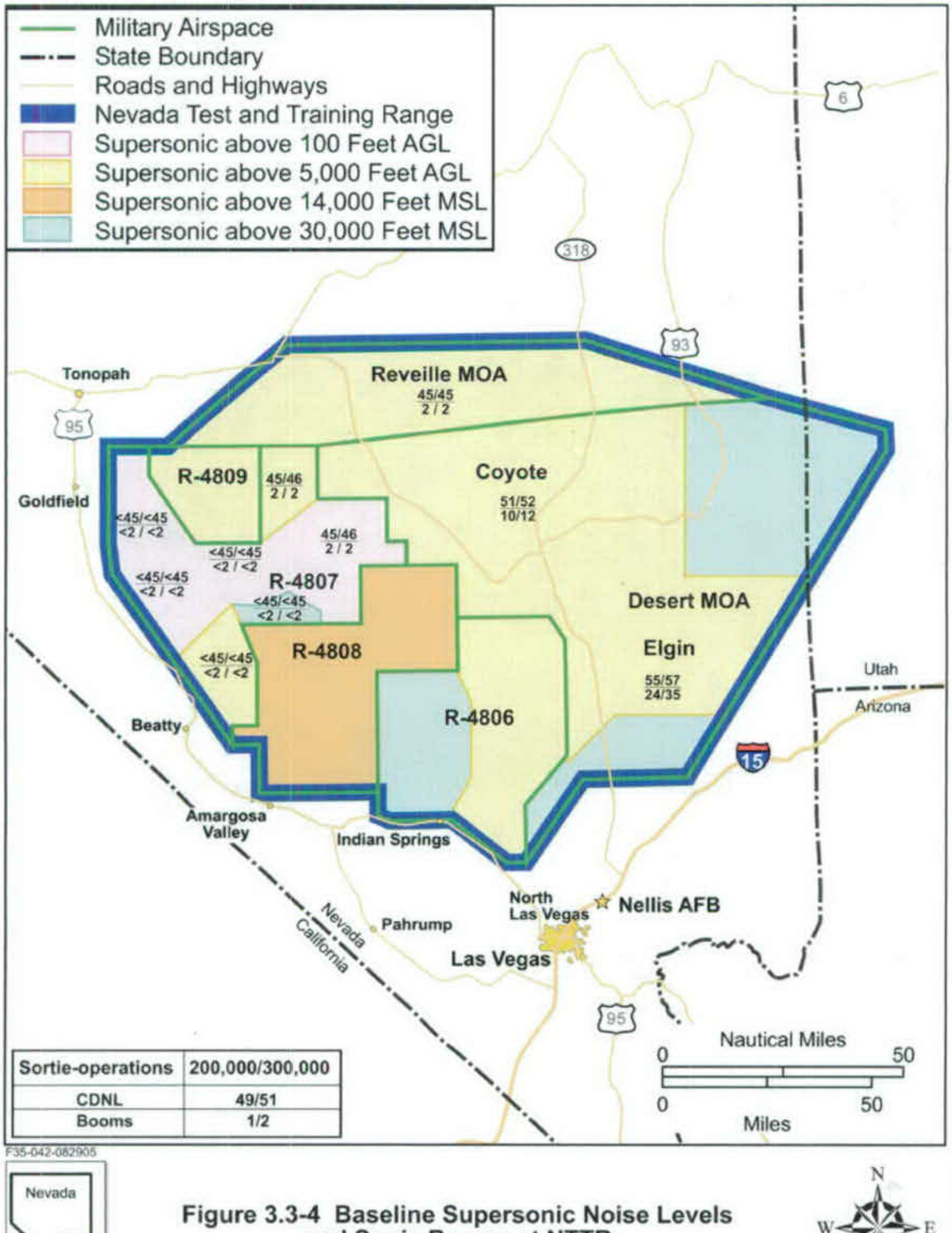


Figure 3.3-4 Baseline Supersonic Noise Levels and Sonic Booms at NTTR

Note: Supersonic and boom calculations apply number of aircraft operations in supersonic, not type.

The estimated number of booms per month potentially heard on the ground, at an average location, in each airspace varies from less than 2 to 35, depending upon the number of sortie-operations and the airspace unit. Individual sonic boom footprints would affect areas from about 10 square miles to 100 square miles. The booms per month values account for the total number of booms and the average area affected by each, and represent the number that would be heard, on average, by an individual on the ground under the airspace.

The noise modeling used to calculate supersonic noise levels and sonic booms applies the underlying assumption that within each airspace unit, sonic booms are distributed homogeneously and in a random nature. The modeling cannot account for a normal statistical distribution because the airspace units are odd shaped in three dimensions, width, length, and altitude. However empirical data, acquired from sonic boom complaints in Alamo and other communities under the airspace, indicate that sonic booms are heard more frequently in some areas more than in others. This result is not unexpected; receptors toward the center of an airspace unit would likely hear more booms than those at the edge of the unit. Therefore, the noise levels indicated in Table 3.3-4 and presented in Figure 3.3-3 may be greater for receptors located toward the central portion of the airspace than those living under the edge of the airspace.

3.4 AIR QUALITY

Understanding air quality for the affected area requires knowledge of: 1) applicable regulatory requirements; 2) types and sources of emissions (for stationary sources) and the horizontal and vertical extent of emissions from mobile sources such as aircraft; 3) location and context of the affected area associated with the proposed action; and 4) existing conditions (or affected environment).

Applicable Regulatory Requirements

Air quality in a given location is described by the concentration of various pollutants in the atmosphere. The significance of the pollutant concentration is determined by comparing it to the federal and state ambient air quality standards. The Clean Air Act (CAA) and its subsequent amendments (CAAA) established the National Ambient Air Quality Standards (NAAQS) for six "criteria" pollutants: 1) ozone (O_3), 2) carbon monoxide (CO), 3) nitrogen dioxide (NO_2), 4) sulfur dioxide (SO_2), 5) particulate matter (PM) less than 10 and 2.5 microns (PM_{10} and $PM_{2.5}$), and 6) lead (Pb). These standards represent the maximum allowable atmospheric concentrations that may occur while ensuring protection of public health and welfare, with a reasonable margin of safety. The Nevada Division of Environmental Protection (NDEP), Bureau of Air Quality (BAQ) has adopted the NAAQS, with the following exceptions and additions: 1) the state annual SO_2 standard is more stringent than the national standard, 2) added an 8-hour CO standard specific to elevations above 5,000 feet above MSL, and 3) added standards for visibility impairment and 1-hour hydrogen sulfide (H_2S) concentrations. The national and state ambient air quality standards are presented in Appendix D. Nellis AFB is considered a major source of air emissions and falls under Title V of the CAAA because it emits either 100 tons per year (tpy) of one criteria pollutant (as is the case with Nellis AFB), 10 tpy of a single hazardous air pollutant (HAP), or 25 tpy of total combined HAPs (neither of these HAP thresholds applies to Nellis AFB).

The CAA requires each state to develop a State Implementation Plan (SIP) which is its primary mechanism for ensuring that the NAAQS are achieved and/or maintained within that state. According to plans outlined in the SIP, designated state and local agencies implement regulations to control sources of criteria pollutants. The CAA provides that federal actions in nonattainment and maintenance areas cannot hinder future attainment with the NAAQS and must conform with the applicable SIP (i.e., Nevada SIP). There are no specific requirements for federal actions in unclassified or attainment areas pertaining to mobile and fugitive source emissions. However, Section 176, General Conformity, of the CAA prohibits federal agencies from supporting any activities that do not conform to an approved SIP in nonattainment and maintenance areas.

Conformity means compliance with a SIP for the purpose of attaining or maintaining the NAAQS. Specifically, this means ensuring the federal activity (such as the F-35 proposed beddown) will: 1) not cause a new violation of existing NAAQS, 2) not contribute to an increase in the frequency or severity of violations of existing NAAQS, or 3) not delay the timely attainment of any NAAQS, interim milestones, or other milestones to achieve attainment. The statutory requirement applies to federal actions in NAAQS nonattainment or maintenance areas only. Under this requirement, certain actions are exempted from conformity determinations, while others are presumed to be in conformity if total project emissions for a given pollutant are below the *de minimis* levels established by regulation. These *de minimis* levels are represented in tons per year. Nellis AFB is located within Clark County which is a nonattainment area for three criteria pollutants: CO, PM_{10}, and 8-hour ozone. Analysis, therefore, of this proposed action must include a review of criteria pollutant emissions to assess whether a conformity determination is needed.

The CAA also establishes a national goal of preventing degradation or impairment in any federally-designated Class I area. As part of the Prevention of Significant Deterioration (PSD) program, mandatory Class I status was assigned by Congress to all national wilderness areas and national memorial parks greater than 5,000 acres and national parks greater than 6,000 acres in existence on August 7, 1977. The PSD program is applicable only to stationary sources such as industrial facilities, not vehicles or aircraft. In Class I areas, visibility impairment is defined as a reduction in visual range and atmospheric discoloration. Stationary sources are typically an issue for visibility within a Class I PSD area. The closest Class I area to the proposed action is Grand Canyon National Park, located in the state of Arizona and well beyond the 100-kilometer distance limitation from Nellis AFB for implementing additional PSD source requirements.

Under Title V, any on-base stationary equipment that emits criteria pollutants and/or HAPs must obtain a permit in order to be constructed and operated. Examples of HAPs include benzene, ethylene, xylene, toluene, and hexavalent chromium. The permit includes a list the applicable regulations, the emissions limits, and specifies how equipment is to be operated in order to minimize emissions. Types of HAPs emission sources found at the base include:

- Fuel Storage Tanks
- Spray Paint Booths, Paint Stripping/Removal, Chemical Paint
- Boilers
- Fuel Dispensing
- Engine Testing
- Abrasive Blasting
- Emergency Generators
- Parts Cleaners/Ovens

Base personnel, who operate equipment emitting these pollutants, must satisfy permit monitoring and record keeping requirements. The air base emissions inventory, undertaken on a yearly basis, presents these emission levels to the EPA and NDEP who are charged with developing and enforcing air quality regulations. These agencies also make regular site visits to perform inspections of records and equipment. In 2006, Nellis AFB emitted a total of 4.89 tons of all HAPs (personal communication, Mathew 2007). Under the Title V permit, Nellis AFB's potential to emit is 11.06 tons of total HAPs (personal communication, Mathew 2007). This remains well below the threshold of 25 tpy established under the CAAA.

Types and Sources of Air Quality Pollutants

Pollutants considered in this analysis include the criteria pollutants measured by state and federal standards. These include SO_2 and other compounds (i.e., oxides of sulfur or SO_x), volatile organic compounds (VOCs), which are precursors to (indicators of) O_3; nitrogen oxides (NO_x), which are also precursors to O_3 and include NO_2 and other compounds, CO, PM_{10}, and $PM_{2.5}$. These criteria pollutants are generated by the types of activities (e.g., construction and aircraft operations) associated with the proposed action. Airborne criteria pollutant emissions of lead (Pb) are not included because there are no known significant lead emissions sources in the region or associated with the proposed action and the no-action alternative.

Location and Context

The affected area for air quality can vary horizontally from 0.3 to 2.5 miles (urban scale) up to 2 to 31 miles or more (regional scale), depending on the pollutant being studied. The affected area for air quality also has a vertical dimension because the emissions occur in a volume of air. This vertical dimension depends upon climatic conditions. The upper vertical limits of the affected area equate to the mixing height for emissions, which varies from region to region based on daily temperature changes, amount of sunlight, winds, and other climatic factors. Emissions released above the mixing height become so widely dispersed before reaching ground level that any potential ground-level effects would not be measurable.

For the areas encompassing Nellis AFB and NTTR, the mixing height used is 7,000 feet AGL. This level was determined through coordination with the Clark County Department of Air Quality and Environmental Management (DAQEM) (personal communication, Parker 2007) and based on the annual average mixing height in this region of Nevada.

3.4.1 Nellis AFB

For the proposed action and no-action alternative, the air quality affected environment for Nellis AFB is the Las Vegas Valley. The Las Vegas Valley has a CO air pollution problem, exceeding federal air quality standards on a seasonal basis; however, the county has not experienced an exceedance of the CO standard since December 2000 and has requested a redesignation by the EPA to maintenance status for CO. Carbon monoxide occurs in the atmosphere as the result of incomplete combustion of fuels. In Las Vegas, as in other urban areas, motor vehicles form the major source of CO emissions, comprising approximately 88 percent of total daily emissions. During the winter months local inversions stagnate air masses and trap pollutants causing local buildup of CO and thus exceedences of federal air pollution standards.

Because of these conditions, a portion of the Las Vegas Valley is designated in nonattainment for several pollutants: "serious" nonattainment for particulate matter and carbon monoxide, and subpart 1 (basic) nonattainment for 8-hour ozone whose precursor pollutants are NO_x and VOCs. In accordance with federal requirements, Clark County has developed both a CO SIP (CCHD 2000) and a PM_{10} SIP (CCHD 2001). In June 2007; however, the County has requested that EPA reconsider the 8-hour ozone nonattainment designation (DAQEM 2007). As of publication of this EIS, the EPA has not announced their decision. Table 3.4-1 provides the emissions budget for CO. For PM_{10}, Clark County established a goal of 72,726 tons per year by 2006 (CCHD 2001). As of June 2007, the PM_{10} achievement report (CCHD 2007) both the 24-hour and annual standards have been met.

Table 3.4-1 Las Vegas Valley CO Emissions Budget (tons)

		1996	*2000*	*2010*	*2020*
CO	Daily	479.1	387.2	425.2	579.7
	Annual	174,871.5	141,328.0	155,198.0	211,590.5

Source: Carbon Monoxide State Implementation Plans, Las Vegas Valley Nonattainment Area, Clark County Nevada (CCHD 2000).

Ground-based air emissions at Nellis AFB are primarily generated from maintenance shops, AGE, boilers, and paint booths. Emissions associated with airfield operations (landing, takeoff, touch-and-go) are calculated based on aircraft activity at the base (Table 3.4-2) (Air Force 1999a). These data include the number of aircraft operations conducted by base-assigned and transient aircraft and apply the same information used to characterize the airfield noise environment.

Table 3.4-2 Summary of Baseline Emissions at Nellis AFB (tons/year)					
Source	***CO***	***VOCs***	***NO_x***	***SO_x***	***PM_{10}***[1]
Ground-Based	14.52	28.07	24.47	0.498	38.0
Aircraft	928	318	444	345	26
Total	**942.52**	**346.07**	**468.47**	**345.5**	**63.80**
Clark County[2]	387,851	50,376	76,293	48,090	53,292
Nellis AFB Percent Contribution	0.2	0.7	0.6	0.7	0.1

Sources: Ground-based emissions, Air Emissions Inventory for 2006 at Nellis AFB (Air Force 2007d); aircraft emissions (Air Force 1999a)

Notes: [1]$PM_{2.5}$ was regulated in 2005 and is not reflected in these inventories.
[2]Clark County 2001 Emissions (USEPA 2007a).

The total annual CO emissions at Nellis AFB represent about 0.2 percent of total CO emissions for Clark County. PM_{10} emissions for Nellis AFB account for about 0.1 percent and both VOCs and NO_x (ozone precursors) represent less than 1 percent of the total Clark County contribution. None of these pollutants represents a significant contribution to the regional air quality (i.e., 10 percent or greater) in the Las Vegas Valley.

3.4.2 Nevada Test and Training Range

The affected environment for NTTR is Lincoln and Nye County. With the exception of its very southern extent nearest Las Vegas (refer to Figure 2-3), NTTR falls within an area that is unclassified for state and federal air quality standards. The very southern extent (less than 5 percent of NTTR) falls within the Las Vegas Metropolitan Area designated as nonattainment for CO and PM_{10}. Total annual emissions associated with aircraft activity in NTTR were calculated based on scenarios reflecting the range of 200,000 or 300,000 annual sortie-operations (Air Force 1999b). As with the aircraft emissions calculations for the base, aircraft emissions estimates for NTTR used aircraft operation summaries presented in Appendix B. Aircraft activity in NTTR airspace for air quality analysis employs annual sortie-operations, typical engine power settings, and typical altitude distributions for a given aircraft type. Table 3.4-3 provides a summary of estimated aircraft emissions for the low-use 200,000 and high-use 300,000 sortie-operation scenarios.

Table 3.4-3 Summary of Baseline Emissions at NTTR (tons/year)					
	CO	***VOCs***	***NO_x***	***SO_x***	***PM_{10}***[1]
Ground-Based	4.99	11.64	22.58	17.74	3.06
Aircraft					
200,000 sortie-operations	110.5	15	2,083.1	81.8	35
Total	**115.49**	**26.64**	**2,105.68**	**99.54**	**38.06**
300,000 sortie-operations	165.6	24.3	3,124.4	122.5	52.8
Total	**170.59**	**35.94**	**3,146.98**	**140.24**	**55.86**
Lincoln County[2]	23,477	1,351	1,622	193	4,487
Nye County[2]	38,311	2,951	1,880	293	7,176

Sources: Ground-based Air Emissions Inventory for 2004 at NTTR includes Creech AFB (formerly Indian Springs Air Force Auxiliary Field) (Air Force 2004c); TTR, Tolicha Peak ECR, and Tonopah ECR (Air Force 2004b); aircraft emissions Air Force 1999b.

Note: [1]$PM_{2.5}$ was regulated in 2006 and would not be reflected in the 2004 inventory.
[2]Lincoln and Nye Counties 2001 Emissions (USEPA 2007b).

In both sortie-operations scenarios, the total emissions for NTTR airspace are dispersed over a volume of air measuring approximately 13,000 cubic miles. Given this volume, very low concentrations of emissions occur. The highest potential for concentration of emissions would occur during low-altitude aircraft activity near ordnance delivery ranges where aircraft make multiple passes, over the same point on the ground, over short periods of time. To evaluate the percent contribution of emissions at low-altitude flight, the Air Force conducted an analysis and presented its conclusions in the F-22 FDE Beddown EIS (Air Force 1999b). This analysis reasonably reflects baseline conditions within NTTR. The computerized Multiple Aircraft Instantaneous Line Source (MAILS) dispersion model was used to assess concentrations of ground-level pollutants resulting from aircraft flight activities. Using data from overall sortie-operations in NTTR, the analysis employed a conservative scenario of low-altitude flight activities over a range airspace unit. The MAILS modeling results demonstrated that even intensive, low-altitude flight activity over a range within NTTR would not result in exceedences of NAAQS. Within the 5 percent of the NTTR coinciding with the area in nonattainment for CO and PM_{10}, estimated concentrations fall well below nonattainment thresholds: 8.61 tons for CO and 3.41 tons for PM_{10} under the highest use scenario. This measure is only an estimate since the affected area consists of a "corner" of the airspace where aircraft tend to fly less frequently, actual emissions would likely fall below the estimate. As such, emissions from these sortie-operations do not measurably affect nonattainment for any criteria pollutants or present a significant regional contribution in either county.

There are three PSD Class I areas within 50 miles of NTTR borders. The Great Basin National Park on the eastern border of Nevada is approximately 45 miles northeast of the eastern corner of NTTR airspace. The closest Class I area in Utah, Zion National Park, is approximately 37 miles east of NTTR boundaries. There is one Class I area in California within 50 miles of NTTR airspace—the northeast corner of Death Valley National Park is located approximately 10 miles from the western portion of NTTR airspace boundaries. However, the combination of low total emissions from NTTR operations and the distance to these PSD Class I areas indicates visibility impairment does not occur, especially because the emission sources (aircraft) are mobile and transitory.

3.5 SAFETY

This section addresses ground, flight, and munitions safety associated with activities conducted by units stationed at or operating from Nellis AFB. These operations include activities at the base itself, as well as testing and training conducted in the military airspace that collectively comprises NTTR. Ground safety considers issues associated with operations and maintenance activities that support base and range operations, including fire and crash response. For NTTR, safety also considers fire risk and management. Flight safety includes aircraft flight risks such as aircraft accidents, and bird-aircraft strikes. Munitions safety assesses the management and use of ordnance or munitions associated with air base operations and training activities.

3.5.1 Nellis AFB

Operations and Maintenance

Day-to-day operations and maintenance activities conducted on Nellis AFB are performed in accordance with applicable Air Force safety regulations, published Air Force Technical Orders, and standards prescribed by Air Force Occupational Safety and Health (AFOSH) requirements. The handling, processing, storage, and disposal of hazardous by-products from these activities are accomplished in accordance with all federal and state requirements applicable to the substance generated. Additional specific data pertaining to hazardous material and waste management are contained in Section 3.11.

Fire and Crash Response

The Nellis AFB military fire department provides fire and crash response. Under current operations, the unit is fully capable of meeting its requirements. There are no identified equipment shortfalls or limiting factors (personal communication, Ridgeway 2005). The base maintains detailed mishap (e.g., aircraft accidents) response procedures to respond to a wide range of potential incidents. These processes assign agency responsibilities and prescribe functional activities necessary to react to major mishaps, whether on or off base. Initial response to a mishap considers such factors as rescue, evacuation, fire suppression, safety, and elimination of explosive devices, ensuring security of the area, and other actions immediately necessary to prevent loss of life or further property damage. After all required actions on the site are complete, the base civil engineer ensures cleanup of the site.

Aircraft Mishaps

The primary public concern with regard to flight safety is the potential for aircraft accidents. Such mishaps may occur as a result of mid-air collisions, collisions with structures or terrain, weather-related accidents, mechanical failure, or pilot error. Flight risks apply to all aircraft; they are not limited to the military.

The Air Force defines four categories of aircraft mishaps: Classes A, B, C, and E/High Accident Potential[1]. Class A mishaps result in a loss of life, permanent total disability, a total cost in excess of $1 million, destruction of an aircraft, or damage to an aircraft beyond economical repair. Class B mishaps result in total costs of more than $200,000, but less than $1 million, or result in permanent partial disability. Class C mishaps involve costs of more than $20,000, but less than $200,000, or a loss of worker productivity of more than 8 hours. Class E/High Accident Potential represent minor incidents not meeting any of the criteria for Class A, B, or C. Class C mishaps form the most common occurrences, primarily involving minor damage and injuries, but rarely affecting property or the public.

Major considerations in any accident are loss of life and damage to property. It is impossible to predict the precise location of an aircraft accident. The probability of an aircraft crashing into a populated area is extremely low, but it cannot be totally discounted. Several factors are relevant: first, FAA regulations instruct pilots to avoid direct overflight of population centers at very low altitudes; second, the brief amount of time the aircraft is over any specific geographic area limits the probability of a disabled aircraft impacting a specific populated area; and third, design and location of the clear zone (CZ) and accident potential zones (APZs) identify areas subject to higher risk from a crash.

The Air Force designed a program for installations to minimize aircraft operational impacts on local communities. The study supporting this program is known as the AICUZ study (as first discussed in Section 3.3). The purpose of the AICUZ program is to promote compatible land development in areas subject to aircraft accident potential and noise. Air Force AICUZ land use guidelines reflect land use recommendations for CZ and APZ I and II. The guidelines recommend land uses which are compatible with airfield operations while allowing maximum beneficial use of adjacent properties.

The CZs, each measuring 4,000 feet wide by 3,000 feet long, extend directly from the ends of the runways. At Nellis AFB, the CZs are wholly contained within the base boundaries and permit no development (Figure 3.5-1). APZ I represents an area beyond the CZ with a significant potential for accidents, but less than the CZ. To the northeast, APZ I measures 4,000 feet wide by 5,000 feet long and lies within the base. On the southwest, APZ I extends off-base from the CZ with westward and southwestern arms associated with flight patterns.

APZ II, which has the lowest potential for aircraft accidents, extends beyond APZ I and measures 4,000 feet wide by 7,000 feet long. About 70 percent of the northeastern APZ lies within the base boundaries; and the southwest APZ II lies entirely off-base.

[1] Class D mishaps do not apply to aircraft.

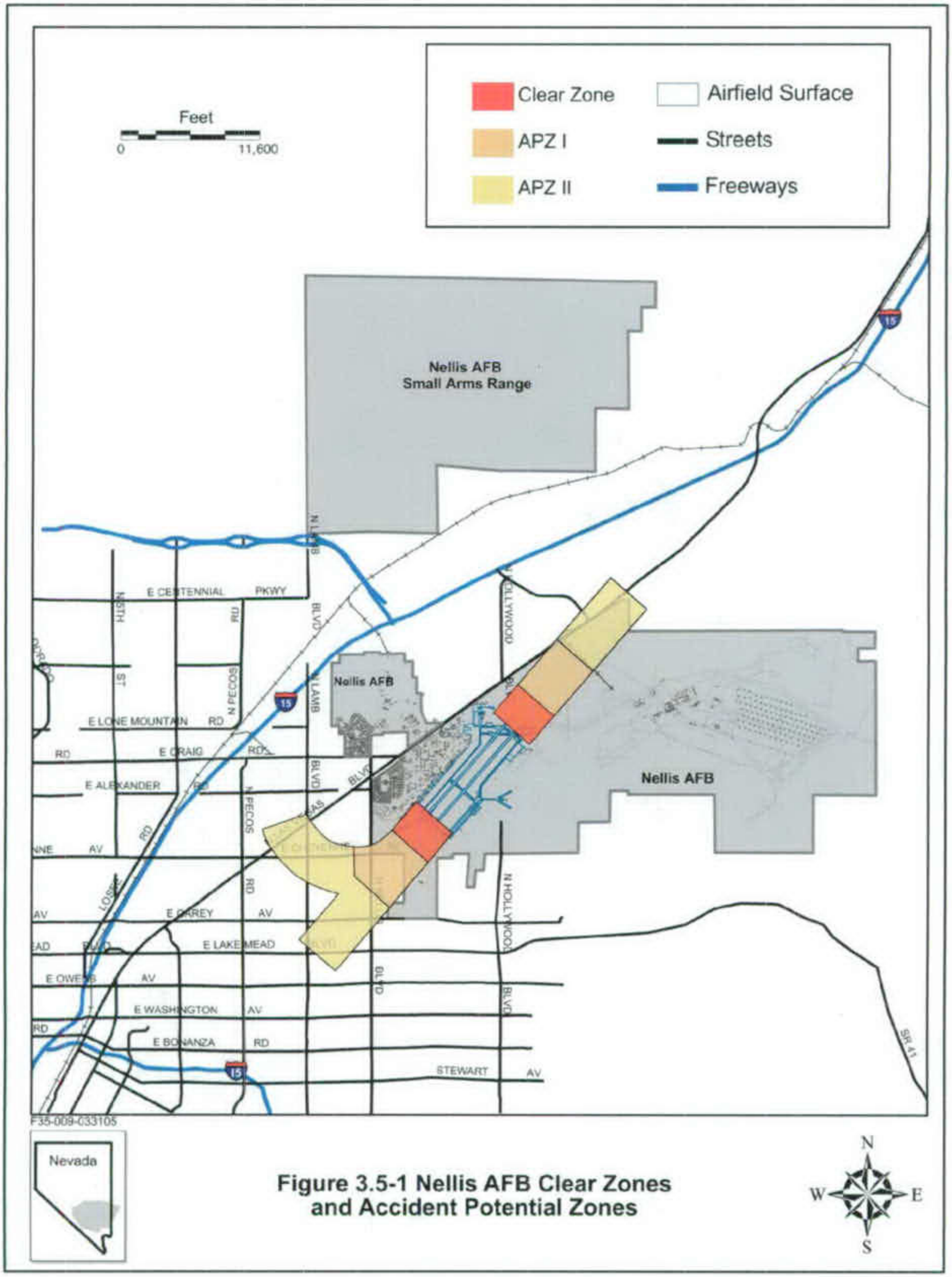


Figure 3.5-1 Nellis AFB Clear Zones and Accident Potential Zones

Secondary effects of an aircraft crash include the potential for fire and environmental contamination. Again, because the extent of these secondary effects is dependent on the situation, they are difficult to quantify. When an aircraft crashes, it may release petroleum, oil, and lubricants that may not all be consumed in a fire and could contaminate soil and water. The potential for contamination is dependent on several factors. The porosity of the surface soils will determine how rapidly contaminants are absorbed. On Nellis AFB and nearby, the soils are not very permeable. The locations and characteristics of surface and groundwater in the area will also affect the extent of contamination to those resources.

Aircraft flight operations from Nellis AFB are governed by flight standard rules. Specific procedures for the base are contained in standard operating procedures that must be followed by all aircrews operating from the installation (Air Force 2005c). In the last 5 years, there have been two Class A aircraft accidents on Nellis AFB, while over 340,000 airfield operations have been conducted (personal communication, 57 WG/SEF 2006).

Bird/Wildlife-Aircraft Strike Hazards

Bird/wildlife-aircraft strike hazards (BASH) constitute a safety concern because of the potential for damage to aircraft or injury to aircrews or local populations if an aircraft crash should occur in a populated area. Aircraft may encounter birds at altitudes of 30,000 feet MSL or higher; however, over 95 percent of reported bird strikes occur below 3,000 feet AGL. Approximately 50 percent of bird strikes happen in the airport or airfield environment, and 25 percent occur during low-altitude flight training (Worldwide BASH Conference 1990).

Migratory waterfowl (e.g., ducks, geese, and swans) pose the most hazard to low-flying aircraft because of their size and their propensity for migrating in large flocks at a variety of elevations and times of day. The potential for bird-aircraft strikes is greatest during spring and fall migratory seasons in areas used as migration corridors (flyways) or where birds congregate for foraging or resting (e.g., open water bodies, rivers, and wetlands). These birds typically migrate at night and generally fly between 1,500 to 3,000 feet AGL during the fall migration and from 1,000 to 3,000 feet AGL during the spring migration.

Although waterfowl are the greatest threat, raptors, shorebirds, gulls, herons, and songbirds also pose a hazard. Peak migration periods for raptors, especially eagles, are from October to mid-December and from mid-January to the beginning of March. In general, flights above 1,500 feet AGL would be above most migrating and wintering raptors. Songbirds (small birds, usually less than one pound) usually migrate at night along major rivers, typically between 500 to 3,000 feet AGL.

For aircraft conducting airfield operations at or near Nellis AFB, the bird-aircraft strike data maintained by the base indicate that from 1987 through 2001, aircraft have experienced 233 bird strikes. Given that airfield operations at Nellis AFB exceeded 1,000,000 during that same period, the occurrence of bird-aircraft strikes in the airfield environment was very low. Nellis AFB and its vicinity include no migration corridors or areas supporting major concentrations of birds. The majority of these bird-aircraft strikes (56.3 percent) occurred at altitudes of 1,000 feet AGL or less. Of this total, 12 percent were classified as Class C mishaps; there were no Class A or Class B mishaps (personal communication, 57 WG/SEF 2005).

Munitions Use and Handling

Personnel at Nellis AFB control, maintain, and store all ordnance and munitions required for mission performance. This includes inert bombs and rockets, live bombs and rockets, chaff, flares, large and small arms ammunition, and other explosive and pyrotechnic devices. Munitions are handled and stored in accordance with Air Force explosive safety directives (Air Force 2001a), and all munitions maintenance is carried out by trained, qualified personnel using Air Force-approved technical data. The airfield also has specific areas designated for live ordnance loading, parking of aircraft loaded with live ordnance, and arming and dearming of ordnance and guns (Air Force 2005c). There are two live ordnance loading areas, LOLA north and south (Figure 3.5-2). Both are located to the east of Runway 03 Right/21 Left. The "hot cargo" pad is located at the northern end of the flightline, just east of Runway 03 Right/21 Left (Figure 3.5-2). Arm/dearm pads are located at the north and south ends of the flight line, and immediately adjacent to the ends of the runways. If a malfunction prevents ordnance release during a mission, and the pilot must return to the base with "hung" ordnance (i.e., any ordnance of which an attempt to release, jettison, launch, or fire from an aircraft did not actuate as designed), the aircraft is parked in revetments in the hung ordnance area while the ordnance is rendered safe. This area is located east of Runway 03 Right and south of the LOLA (Air Force 2005c). Sufficient storage facilities exist for current types and amounts of ordnance, and all facilities are approved for the ordnance they store.

3.5.2 Nevada Test and Training Range

Fire Risk and Management

The Nellis AFB military fire department provides fire and crash response by convoy to those ranges within NTTR that are close to Nellis AFB. The unit is fully equipped and staffed with qualified personnel. There are no identified equipment shortfalls or limiting factors (personal communication, Ridgeway 2005). Elements of the fire department are dispersed throughout NTTR, and would respond to range fires on DoD-withdrawn lands. If required, additional response support could be provided by BLM in accordance with a memorandum of agreement. Fire suppression of wildland fires on NTTR is the responsibility of the BLM and is geared toward protecting lives and facilities at the widely scattered

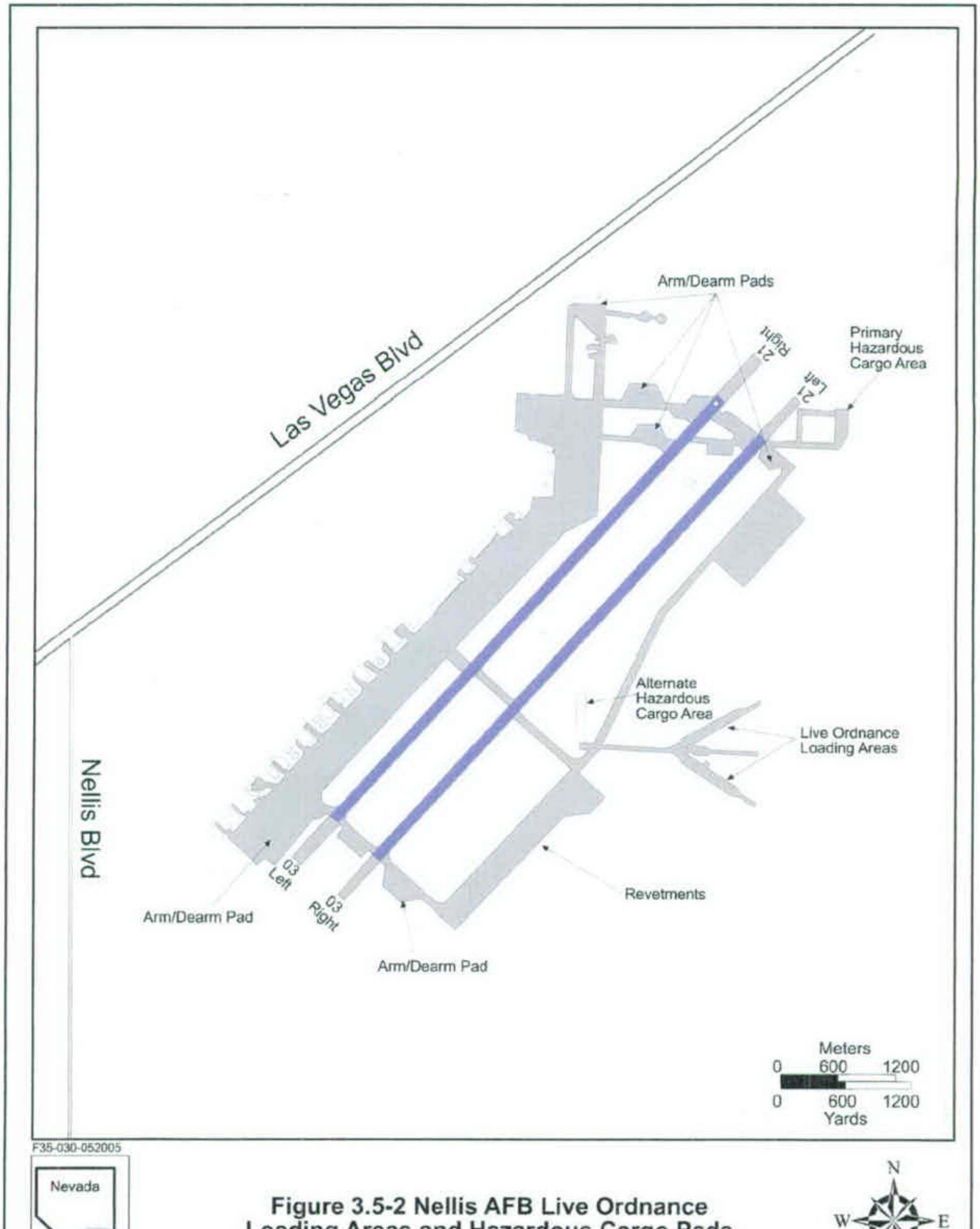


Figure 3.5-2 Nellis AFB Live Ordnance Loading Areas and Hazardous Cargo Pads

industrial complexes, not the suppression of wildfire. The Air Force is required to take necessary precautions to prevent and suppress brush and range fires occurring within and outside lands withdrawn by Public Law (PL) 106-65 as a result of military activities. As per the withdrawal, the Air Force is authorized to seek assistance from the BLM in the suppression of such fires. Nellis AFB has an existing Support Agreement with the BLM, Las Vegas Field Office for fire fighting support (personal communication, Christensen 2005). Fire and crash response on the South Range is provided by the Air Force fire department at Creech AFB; if needed, additional assistance can be provided, under an existing mutual support agreement for fire suppression with the Air Force by Clark County (personal communication, Williams 2005).

Fires do occasionally occur on NTTR lands. While an average of four to five small (less than 3 acres) fires occur each year, they result from a variety of sources, including lightning and flares. Under NTTR MOAs, fires tend to be larger (less than 100 acres), but have been found to be caused mostly by cigarettes, matches, vehicle sparks, or fireworks (Air Force 1997a).

Compared to the 250,000 flares dispersed over NTTR annually (personal communication, 98 OSS/OSO 2005), fires attributable to flares are rare for several reasons. Foremost, the altitude and other restrictions on flare use minimize the possibility for burning material to contact the ground. Second, to start a fire, burning flare material must contact vegetation that is susceptible to burning at the time. As such, the probability of a flare igniting vegetation would be expected to be equally minimal. Third, the amount and density of vegetation, as well as climate conditions, must be capable of supporting the continuation and spread of fire.

Aircraft Mishaps

Based on historical data on mishaps at all installations, and under all conditions of flight, the military services calculate Class A mishap rates per 100,000 flying hours for each type of aircraft in the inventory (combat losses are excluded from these mishap statistics). In the case of MOAs and restricted areas, an estimated average sortie-operation duration is used to estimate annual flight hours in the airspace. Therefore, the Class A mishap rate per 100,000 flying hours can be used to compute a statistical projection of anticipated time between Class A mishaps in each applicable airspace unit. It should be emphasized that those data considered are only statistically predictive; the actual causes of mishaps are due to many factors, not simply the amount of flying time of the aircraft.

Several factors can influence the calculation of this projected time interval between Class A mishaps. Since the calculation is based on hours of flight time per year, an indication of increased risk can result from a large number of aircraft flying in the airspace, or a smaller number flying for extended periods of time. To place these values into context, it is also appropriate to consider the probability of a mishap, which accounts for each aircraft's exposure. Aircraft mishap data were analyzed in both the 1999 Nellis

Range Renewal Legislative EIS (Air Force 1999b) and the F-22 FDE and WS Beddown EIS (Air Force 1999a). These analyses demonstrated that the probability of Class A mishap within NTTR airspace was very low. The probability of a Class A mishap occurring within the NTTR airspace units (i.e., MOA and restricted airspace) ranged from a low of 0.000003 to a high of 0.000030. Flight conditions and sortie-operations have remained the same to 2007, so the levels of risk of mishaps continue to remain low. Overall, there is low risk associated with flight operations within NTTR. In fact, over the last 5 years, there have been eight Class A mishaps within NTTR (personal communication, 57 WG/SEF 2006) while the total number of sortie-operations has been well over 1 million.

Bird/Wildlife-Aircraft Strike Hazard

The Air Force BASH Team maintains a database that documents all reported bird-aircraft strikes. Historic average annual information for the last 10 years for NTTR airspace indicates that ten bird-aircraft strikes have been reported. Of these, one resulted in a Class B mishap and three in Class C mishaps. Given that the sortie-operations within NTTR account for millions of miles flown at all altitudes, the occurrence, and probability of bird-aircraft strikes are negligible.

Ordnance Use

Release of ordnance is limited to ranges within NTTR. Air Force safety standards require safeguards on weapons systems and ordnance to ensure against inadvertent releases. All munitions mounted on an aircraft (as well as the guns carried in the aircraft) are equipped with mechanisms that preclude release or firing without activation of an electronic arming circuit (Air Force 2001a).

System malfunctions or materiel failures, possibly resulting in either an inadvertent release of ordnance or the release of a dud component that fails to operate properly, cannot be totally discounted. However, studies have shown that the probability of such an inadvertent release of ordnance occurring and resulting in injury to a person or damage to property is minimal (Air Force 2005c).

Air-to-ground ranges in NTTR support delivery of a wide range of ordnance. Approximately 80 percent of the ranges accommodate training or inert bombs and rockets, approximately 64 percent accommodate live bombs, rockets, and missiles, and approximately 61 percent accommodate strafing.

Based on historical data, "footprints" have been developed that describe a geographic area within which a training munition may ultimately be expected to come to rest on the ground. These zones have a long (i.e., beyond the target), short (i.e., in front of the target), and cross-range dimension. Based on data developed from varied attack profiles, flown by varied aircraft, and the type of ordnance delivered, frequency distributions for the dispersion of these munitions have been developed and, with a 95 percent confidence level, a geographic area within which 99.99 percent of the delivered munitions will be contained has been described (Air Force 1998a, 2007a). This geographic area is then considered the weapon footprint, and is unique for each weapon system, aircraft, ordnance type, and delivery profile. The weapon footprints are then used to define the area where people are prohibited from entry when the range and/or targets are in use. Application of these footprints is a prime safety concern, and is one of the elements contributing to the target/ordnance compatibility documentation contained in Nellis AFB Addendum A to AFI 13-212, Volume 1 (Air Force 2007a).

Chaff and Flares

Chaff and flares are also used throughout many portions of NTTR. Their use is controlled in accordance with standard operating procedures detailed in AFI 13-212, Volume 1, Nellis AFB Addendum A (Air Force 2007a). Depending on daily chaff restrictions, self-protection chaff may be employed in NTTR between 300 feet AGL and 10,000 feet AGL. No chaff is authorized in R-4808 or R-4809. Depending on the type of chaff deployed, how it is used, and where it is used, altitudes authorized for release vary. Periodically, restrictions are published regarding the use of flares or chaff. Reasons for restrictions include extreme ground fire hazards, threats to ground property, high personnel injury potential, and ATC radar interference.

Chaff consists of very small fibers that reflect radar signals and, when dispensed from an aircraft, form a cloud that temporarily hides the aircraft from radar detection. Although the chaff may be ejected from an aircraft using a pyrotechnic charge, the chaff itself is not explosive. Chaff is composed of silicon dioxide fibers ranging in diameter from 0.7 to 1 mil (thousandth of an inch), coated with an aluminum alloy and a slip coating of stearic acid (fat). Analyses of the materials comprising chaff indicate that they are non-toxic in the quantities used (Air Force 1997a). About 500,000 to 3,000,000 fibers are contained in each chaff bundle.

The public has raised concerns regarding human health risks associated with the use of chaff. In response, the General Accounting Office has reviewed the available information on chaff and asked the DoD to evaluate the need to conduct further studies on potential public health risk. Available information, as summarized below, indicates that chaff does not pose a significant health risk (Air Force 1997a).

Silicon dioxide is an abundant compound in nature that is prevalent in soils, rocks, and sands. The trace quantities of metals included in the mica fibers are not present in sufficient quantities to pose a health risk. Aluminum is non-toxic and is one of the most abundant metals in the earth's crust, water, and air. Trace quantities of silicon, iron, copper, manganese, magnesium, zinc, vanadium, or titanium may be found in the alloy, but the quantities involved are a very small percentage of levels that might cause concern. Stearic acid is found naturally as a glyceride in animal fat and some vegetable oils.

Air quality concerns regarding chaff use address the potential for chaff to break down into respirable particles and the possibility that hazardous air pollutants may be generated from the cartridges used with some chaff types. Chaff has been test-fired in a controlled environment to determine its potential to break down into respirable particulates. The finding of this test and a screening health risk assessment (Air Force 1997a) concluded that chaff posed no significant air quality or respiration concerns.

The potential for chaff to affect soil and water is remote. Laboratory tests of chaff indicated little or no potential for adverse effects on soil (Air Force 1997a). No adverse impacts on biological resources have been identified with regard to ingestion or inhalation of chaff. The extensive dispersal and decomposition of chaff fibers on lands under NTTR would limit the exposure of grazing and foraging animals to chaff. Studies on grazing and foraging livestock provide an indicator of the lack of effects of chaff on animals. Livestock apparently avoided eating clumps of chaff when mixed with feed. Only when the mixture of chaff and feed were coated in molasses would the animals eat it. None of the subject livestock exhibited any observable health effects. Data from livestock have shown that the chaff fibers tend to be too large to penetrate the larynx (Air Force 1997a). Such fibers would be expelled through the nose or swallowed. Furthermore, chaff particles would represent a small percentage of the particulates (e.g., dust, vegetal material) regularly inhaled by animals (Air Force 1997a).

Records indicate the release of approximately 400,000 bundles of chaff within NTTR airspace annually. Assuming a conservative average of 3 million fibers per bundle and even distribution throughout NTTR, the area could contain one chaff fiber per 22 square feet. Field studies from NTTR observed a lower density than this estimate (Air Force 1997a), probably due to the fragmentation of the fibers.

Flares consist of magnesium and teflon pellets that burn rapidly and completely after being dispensed. A flare begins burning immediately after it is expelled; reaching its highest temperature (1,000 degrees Fahrenheit) by the time it passes the tail of the aircraft. The actual amount of time it takes for a flare to burn out completely is classified. The minimum release altitude is that altitude which allows the flare to burn out before reaching 100 feet above the ground. Minimum flare release altitude over manned sites, ground parties, or within 3 nm of forested areas is 5,000 feet AGL. The use of self-protection flares in a MOA is limited to 5,000 feet AGL and above, providing an additional margin of safety to prevent burning flare material from contacting the ground. When the fire code is "extreme" flares are not permitted below 5,000 feet AGL in any airspace. The 98 OG/CC determines if additional restrictions or modifications are needed based on prevailing climatic conditions (Air Force 2007a).

Toxicity of flare materials is minimal because magnesium, the primary material found in flares, is considered not likely to be ingested by humans or animals. Impulse cartridges and initiators used with some flares contain chromium and, in some cases, lead; hazardous air pollutants under the Clean Air Act. However, a screening health risk assessment concluded that they do not present a health risk in the quantities involved. Laboratory analyses of flare pellets and flare ash indicate that these materials have little potential for affecting soil or water resources (Air Force 1997a). Field studies similar to those conducted for chaff indicate that flare debris does not accumulate in noticeable quantities; therefore, there is little potential to impact resources (Air Force 1997a).

Wind Generators

The development and use of renewable energy, such as wind generating energy facilities have become important, and several wind generators can be found in the region around NTTR. The airspace manager at Nellis AFB has evaluated the location of these generators and determined that they do not pose a threat to aircrew safety. Range personnel ensure aircrews are also aware of the objects and the potential impacts with regard to safety, electromagnetic interference and radar signature, and operational security. The Air Force is formulating a policy to ensure future placement of energy development facilities are coordinated with appropriate federal and state agencies, and communities in an effort of avoid conflicts with NTTR mission operations and safety.

3.6 LAND USE AND RECREATION

Land use generally refers to human modification of the land, often for residential or economic purposes. It also refers to use of land for preservation or protection of natural resources such as wildlife habitat, vegetation, or unique features. Human land uses include residential, commercial, industrial, agricultural, or recreational uses; natural features are protected under designations such as national parks, national forests, wilderness areas, or other designated areas. The attributes of land use include general land use and ownership, land management plans, and special land use management areas. Land ownership is a categorization of land according to the type of owner; the major land ownership categories include federal, state, and private. Underlying NTTR airspace, federal lands are further designated as U.S. Forest Service (USFS), BLM, USFWS, DOE, and DoD managed. Land uses are frequently regulated by management plans, policies, and ordinances that determine the types of uses that are allowable or protect specially-designated or environmentally-sensitive attributes. Special land use management areas are identified by agencies as being worthy of more rigorous management.

3.6.1 Land Use

Affected areas for land use consist of Nellis AFB, including the area adjacent to the base subject to aircraft noise, and NTTR, which includes the ranges and all other lands under NTTR airspace.

Nellis AFB

On-Base Land Use

Land uses on Nellis AFB are detailed in the *Nellis Air Force Base General Plan* (Air Force 2002a); the following summarizes those uses. Nellis AFB is located in southern Nevada and is about 8 miles northeast of Las Vegas in Clark County. It is composed of 14,161 acres (refer to Figure 2-1) and is divided into three areas: Area I, the Main Base; Area II, the MSA/Wilderness Study Area, REDHORSE Squadron, REDHORSE Reserve Squadron, and Munitions Squadron; and Area III, including Manch Manor housing, the hospital, temporary lodging facilities, Family Camp, and an industrial area. There are more than 2,000 buildings in the Nellis AFB inventory.

Area I is located east of Las Vegas Boulevard and contains 30 percent of the total base land area. Area I contains the greatest variety of land use activities, including runways, industrial facilities, housing areas, and most of the base's administrative, training, and support facilities.

Area II is located northeast of the Main Base and includes the munitions/weapons storage area and associated facilities; this area is 60 percent of the total base land area. The majority of Area II is set aside as safety zones, open space, and industrial; there is also a minor allocation of land and facilities to administrative, commercial, dormitories, and outdoor recreation.

West of Las Vegas Boulevard is Area III, containing 10 percent of the total base land area. Land use at Area III consists of housing, recreational facilities, and some light industrial areas, interspersed with considerable open space.

Open space accounts for about 66 percent of all Nellis AFB land; however, a great deal of this is mandatory open space to provide safety zones around munitions storage or similar facilities. Of the total open space, 75 percent is located in Area II; most of this land is unavailable for future development because it is mandatory open space for explosive safety zones and clear zones. When munitions storage and directly associated facilities and safety zones are combined, munitions operations account for approximately half of the total Nellis AFB land area.

Another land use criteria on and around Nellis AFB is designed to minimize the effects of a potential aircraft accident. Clear, safety, and accident potential zones (refer to Figure 3.5-1) have been established around the airfield. The safety zones occur both on-base and extend to off-base lands not owned by DoD. Within clear and safety zones, construction is either prohibited (CZ) or limited in terms of placement and height (APZ or safety zone). In APZ I, DoD recommends that land uses be limited to light industrial, manufacturing, transportation, communications utilities, wholesale trade, open space, and agricultural uses. Uses that concentrate people in small areas are not considered acceptable. It is recommended that land uses within APZ II include all of those considered compatible with APZ I, as well as low density residential, service, and retail trade. Uses that concentrate high densities of people in small areas are not considered appropriate in APZ II. On-base land uses are compatible with the CZs and APZs (Air Force 2004e).

Noise levels of 65 dB (DNL) to greater than 85 DNL affect the base, with the highest noise levels on and around the runway and flightline. Land affected by noise levels of 85 DNL or greater lie within the boundaries of Nellis AFB (refer to Figure 3.3-1). All of Area I underlies noise contours of 65 DNL or greater whereas large portions of Areas II and III lie outside the 65 DNL contours. The Nellis Terrace Housing Area, the elementary school, and airman dormitories in Area I are within 70 DNL and higher noise contours. Nellis AFB is in the process of incorporating engineered noise level reduction measures into the designs for future renovation and construction of Area I and II facilities within noise contours that exceed 65 DNL (Air Force 2004e).

Off-Base Land Use

Three communities lie adjacent to Nellis AFB: Sunrise Manor to the southeast, North Las Vegas to the west and north, and the City of Las Vegas, south of the base (Figure 3.6-1). Overall, most development occurs south and west toward the Las Vegas urban area and includes the unincorporated communities of Sunrise Manor and North Las Vegas. To the north and northeast, most of the land is open range and mountain areas. Property to the east of Nellis AFB is primarily undeveloped and mainly under the management of the BLM. Commercial/industrial uses (e.g., fuel storage, race track) exist along Las Vegas Boulevard. To the south and west, land use is characterized by strip commercial parcels, mobile homes, single family homes, and industry.

Area land uses in the vicinity of Nellis AFB are analyzed and described in The City of North Las Vegas Land Use Master Plan Map (1999), the Airport Environs Element of the Clark County Comprehensive Plan (CCDCP 1998), and the Sunrise Manor Land Use Plan (CCDCP 1999). These plans consist of land use maps and policies that serve as a guide for making land use decisions. Regulations have been adopted by each community to implement their plans and policies, although Clark County has established ordinances associated with the Nellis AFB environs. The ordinances provide for a range of uses compatible with airport accident hazard and noise exposure areas and prohibits the development of incompatible uses detrimental to public health or safety. Clark County has incorporated these land use recommendations in the Clark County Unified Development Code, Title 30, Section 30.48, Part A, Airport Environs Overlay District, dated March 31, 2004, under the authority of Chapter 278, Planning and Zoning, of the Nevada Revised Statutes. Noise compatibility and airport environs implementing standards have also been adopted in the Clark County Public Health and Safety Programs: Airport Environs Plan, an amendment of the Clark County Comprehensive Plan (CCDCP 1998). Throughout the remainder of this evaluation of land use (Chapters 3.6 and 4.6); therefore, the Clark County airport environ contours (versus the contours presented in section 3.3) are used as the baseline condition because the county uses these contours to manage lands adjacent to Nellis AFB.

Figure 3.6-1
Communities around Nellis AFB

Clark County has established land compatibility use zones that are associated with the CZ, APZ I, APZ II, and noise contours 65 to 70 DNL, 70 to 75 DNL, 75 to 80 DNL, and greater than 80 DNL. As noted previously, these contours are used by Clark County for zoning and land use but do not match current baseline conditions for Nellis AFB. Compatible land uses within these zones is described in Table 3.6-1 and they are consistent with the recommendations of the Air Force and the Standard Land Use Classification Manual (Table 3.6-2). In general, the regulations prohibit development within CZs and discourage anything other than low density development in APZ I and APZ II. Residential development is restricted to low-density developments with noise attenuation in zones greater than 80 DNL, 75 to 80 DNL, and 70 to 75 DNL.

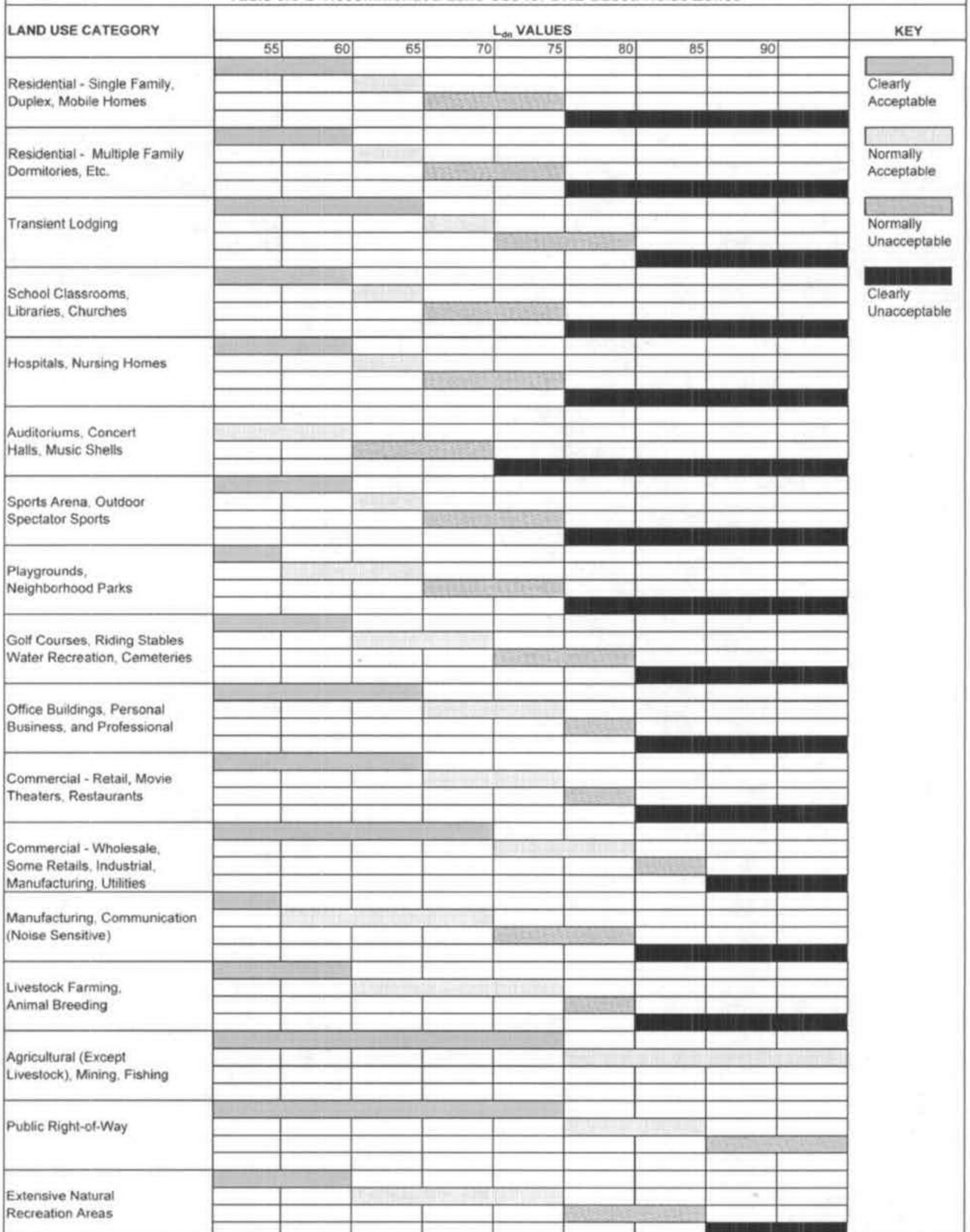
Table 3.6-1 Clark County Land Use Compatibility in the Airport Environs

Land Use	*Clear Zone*	*APZ I*	*APZ II*	*65-70 DNL*	*70-75 DNL*	*75-80 DNL*	*>80 DNL*
Commercial	No	No	Yes[3]	Yes	Yes[5]	Yes[5]	No
Industrial	No	Yes[3]	Yes[3]	Yes	Yes	Yes[5]	Yes[5]
Open/Agricultural	No[1]	Yes[3]	Yes[3]	Yes	Yes	Yes[5]	Yes[1]
Recreational	No[2]	Yes[3]	Yes[3]	Yes	Yes	No	No
Residential	No	No	Yes[4]	Yes[5]	No	No	No

Notes: [1] Open land acceptable
[2] Golf courses; driving ranges acceptable
[3] Low density/intensity only
[4] Less than two single family units per acre acceptable
[5] With noise attenuation features

In keeping with recommendations and regulations, both CZs are on base. The APZs, however, contain a mixture of all land use types, including 18 acres of residential development (Table 3.6-3). The northern APZ II contains the Las Vegas Motor Speedway. Population concentrations at the speedway may exceed the Air Force density recommendations of 50 persons per acre. However, races are held on weekends and evenings during hours of minimal flying operations. Within the southern APZs, development is more problematic. Within APZ I the majority of development adjacent to the base is light industrial and commercial, which is compatible provided densities are not exceeded. The most critical example of incompatibility within APZ I is the Carefree Country Manufactured Home Community which is not accounted for in the county land use database. A small amount of low-density residential development also occurs; however, it does not exceed one dwelling unit per acre. The total number of residents living within APZ I is estimated at 837 (Air Force 2004e). APZ II contains a mix of industrial, commercial, and residential development. Mobile home parks and apartment complexes constitute most of the residential activity. Within either APZ, these forms of residential development are incompatible according to Air Force development density guidelines (Air Force 2004e).

Table 3.6-2 Recommended Land Use for DNL-Based Noise Zones



Source: U.S. Department of Housing and Urban Development 1991.

Table 3.6-3 Land Use Within CZs and APZs			
Land Use Category	***Existing Land Use (Acres)***		
	CZ	*APZ I*	*APZ II*
Commercial	0	0	19
Industrial	0	373	1,440
On Base	555	601	419
Open	0	0	69
Public	0	21	17
Recreational	0	0	0
Residential	0	0	18
Total	**555**	**995**	**1,982**

Clark County Airport Noise Environ contours show approximately 25,831 acres affected by sound levels greater than 65 DNL (Table 3.6-4). Existing industrial and recreational land uses are compatible with these noise contours. However, some incompatibility characterizes existing land use south of Nellis AFB. This potentially incompatible development has occurred despite a 1992 AICUZ study which identified incompatible land uses within 65 DNL noise contours (Air Force 1992a). In fact, in 1999 over 700 acres of residential development occurred in areas with residential restrictions under Clark County's regulations (Air Force 1999a).

Table 3.6-4 Land Ownership Under Clark County Airport Noise Environ Contours (in acres)							
Land Ownership	***Noise Contours (dB DNL)***						
	65-70	*70-75*	*75-80*	*80-85*	*>85*	*Total Acres*	*Total (%)*
BLM	9,535	3,958	563	0	0	15,625	60
Private	6,119	3,180	1,896	548	32	10,206	40
Total	**15,654**	**7,138**	**2,459**	**548**	**32**	**25,831**	**100**

Land ownership for the area outside Nellis AFB encompassed by Clark County baseline noise levels exceeding 65 DNL is presented in Table 3.6-4. Within this area, 40 percent of the land is privately owned, primarily to the southwest of Nellis AFB. Sixty percent, mostly to the northeast, is federal undeveloped land managed by the BLM. In areas with noise levels exceeding 65 DNL, most of the land is open or industrial. Approximately 14 percent is residential, with commercial and public lands comprising 10 percent of the total. Residential development occurs in areas with noise levels up to 80 DNL (Figures 3.6-2a and b; Table 3.6-5). Industrial development in areas with noise levels greater than 80 DNL totals approximately 534 acres. Although not appearing in the Clark County database, portions of the Carefree Manufactured Home Community are found on land with noise levels exceeding 80 DNL.

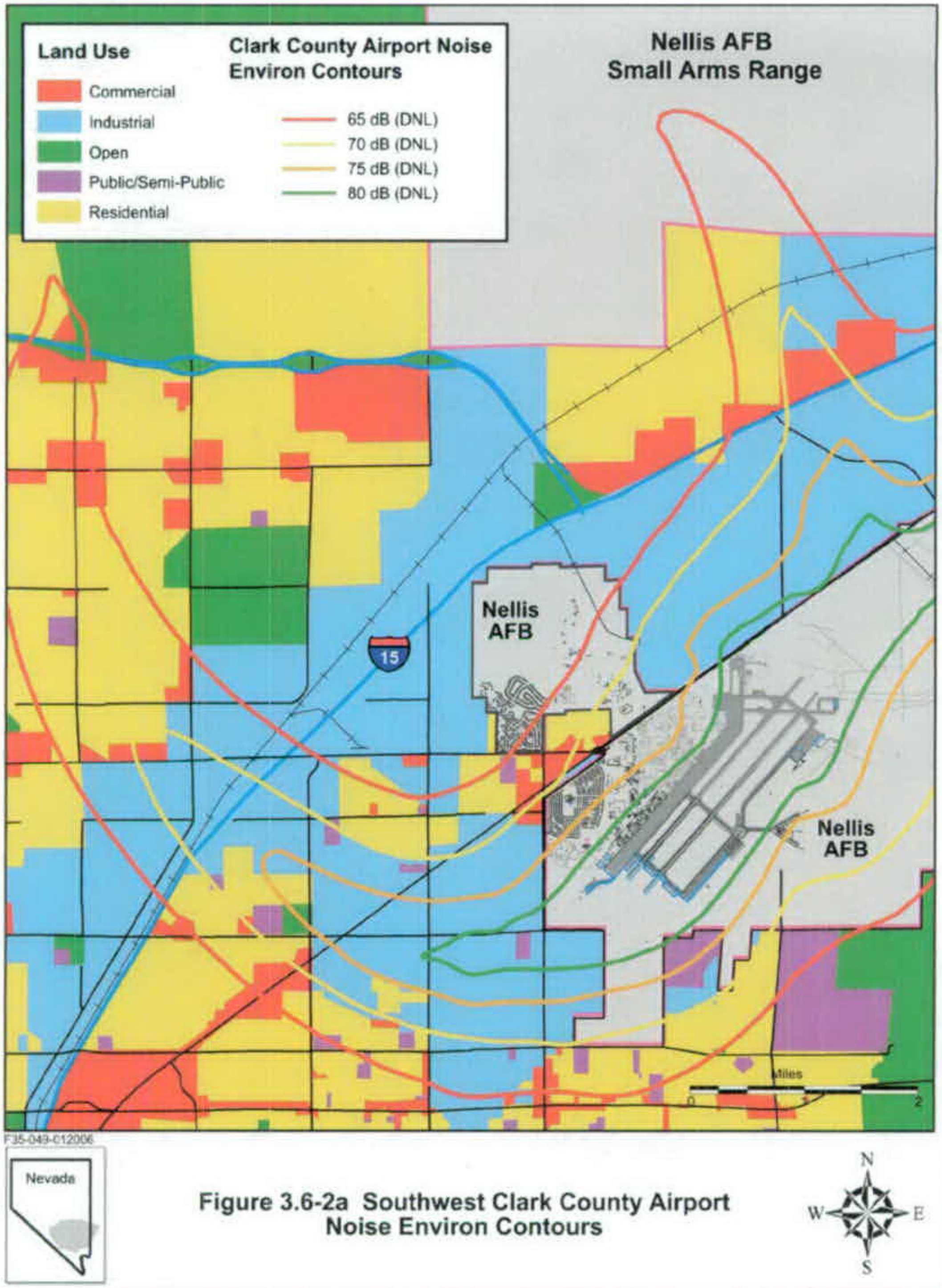


Figure 3.6-2a Southwest Clark County Airport Noise Environ Contours

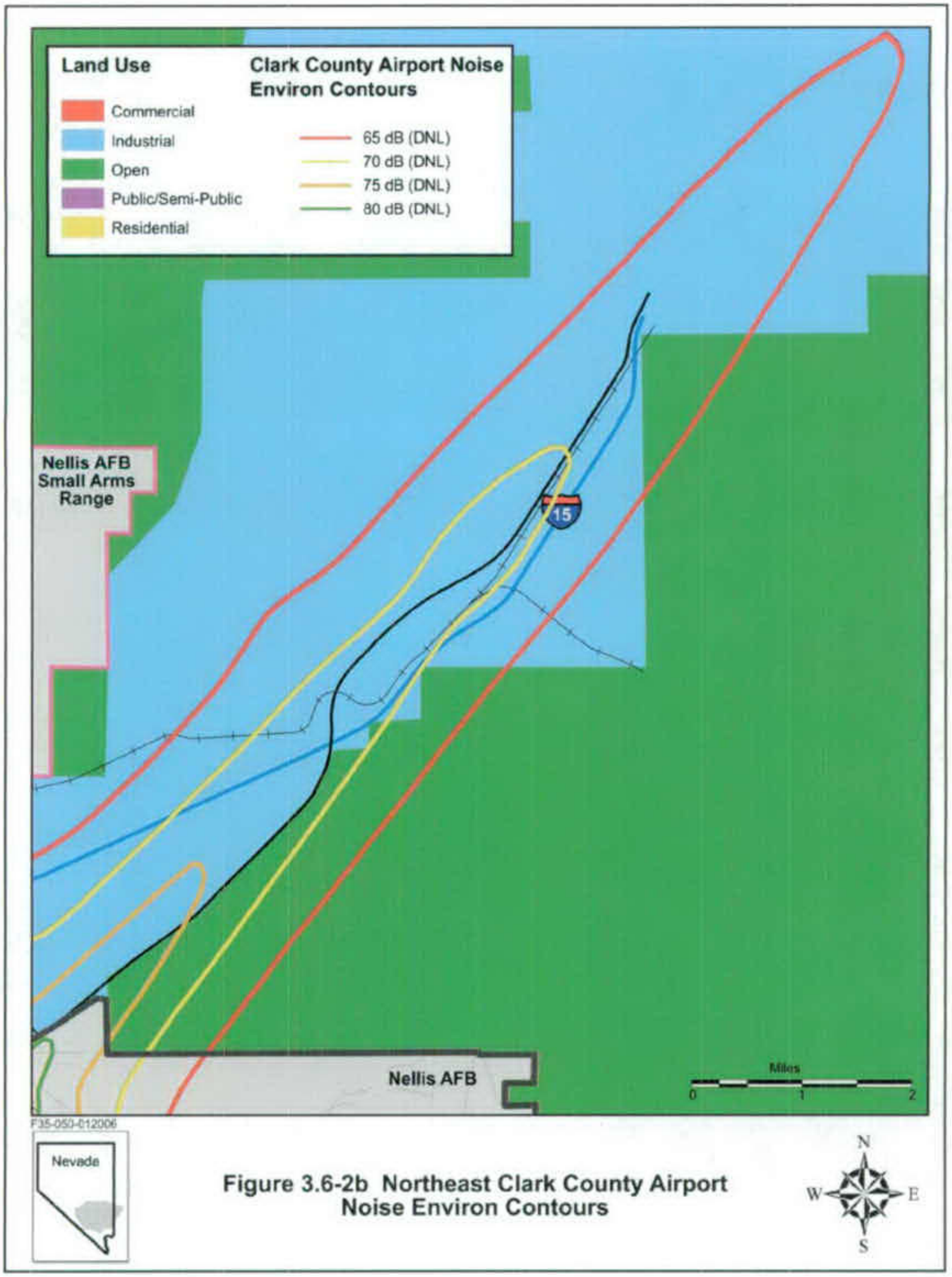


Figure 3.6-2b Northeast Clark County Airport Noise Environ Contours

Table 3.6-5 Land Use Within Clark County Airport Noise Environ Contours (in acres)							
Land Use Category	***Existing Noise Contours (dB DNL)***						
	65-70	*70-75*	*75-80*	*80-85*	*>85*	*Total Acres*	*Total (%)*
Commercial	655	288	0	0	0	943	3%
Industrial	8,165	5,323	2,032	502	32	16,054	64%
Open	2,270	869	271	26	0	3,436	13%
Public	1,053	327	87	20	0	1,487	6%
Residential	3,511	331	69	0	0	3,911	14%
Total	**15,654**	**7,138**	**2,459**	**548**	**32**	**25,831**	**100%**

The 75 to 80 DNL contours impact approximately 2,459 acres supporting 2,454 residents. Roughly 69 acres of residential development are affected (USCB 2006a, 2006b). Approximately 7,138 acres and 14,715 residents are exposed to 70 to 75 DNL noise levels. Most of the housing, besides mobile homes, is relatively new and should contain sound attenuation or thermal insulation. Recreational, industrial, and commercial land uses are all considered to be compatible. The 65 to 70 DNL noise levels affect approximately 15,654 acres and over 30,000 residents. The predominant land use is industrial or open agriculture and is mostly undeveloped. Residential development comprises 3,511 acres, the majority of which is within Sunrise Manor. Sound attenuation requirements for residences within Clark County's airport overlay districts and modern energy conservation designs for residences outside of the overlay districts should allow most of these residences to be compatible. Mobile home parks, such as those located south of Craig Road remain incompatible according to Air Force recommendations.

To determine the potential effects of aircraft noise on underlying populations, a measure of annoyance is used (refer to Section 3.3 and Appendix C for noise-specific information). It is estimated that 12 percent of people could be "highly annoyed" when exposed to noise levels of 65 DNL and 54 percent when exposed to noise levels higher than 80 DNL. Current levels around Nellis AFB could affect 48,157 people, 6,000 of whom are potentially highly annoyed, although the 2003 AICUZ estimated that 24,000 people were affected, with 5,000 potentially highly annoyed (Air Force 2004e). Public facilities such as schools, churches, and parks also occur within the 65 to greater than 80 DNL noise contours (Figure 3.6-3 and Table 3.6-6). Currently, 9 churches, 10 schools, and 5 parks are found in areas with noise levels between 65 and 70 DNL; and 4 churches, 3 schools, and 4 parks occur in areas with noise levels exceeding 70 DNL.

Table 3.6-6 Noise Sensitive Receptors Within Current Noise Contours (dB DNL)				
Noise Receptor	***65-70***	***70-75***	***75-80***	***>80***
Schools	10	2	1	0
Churches	9	3	1	0
Parks	5	2	1	1
Total	**24**	**7**	**3**	**1**

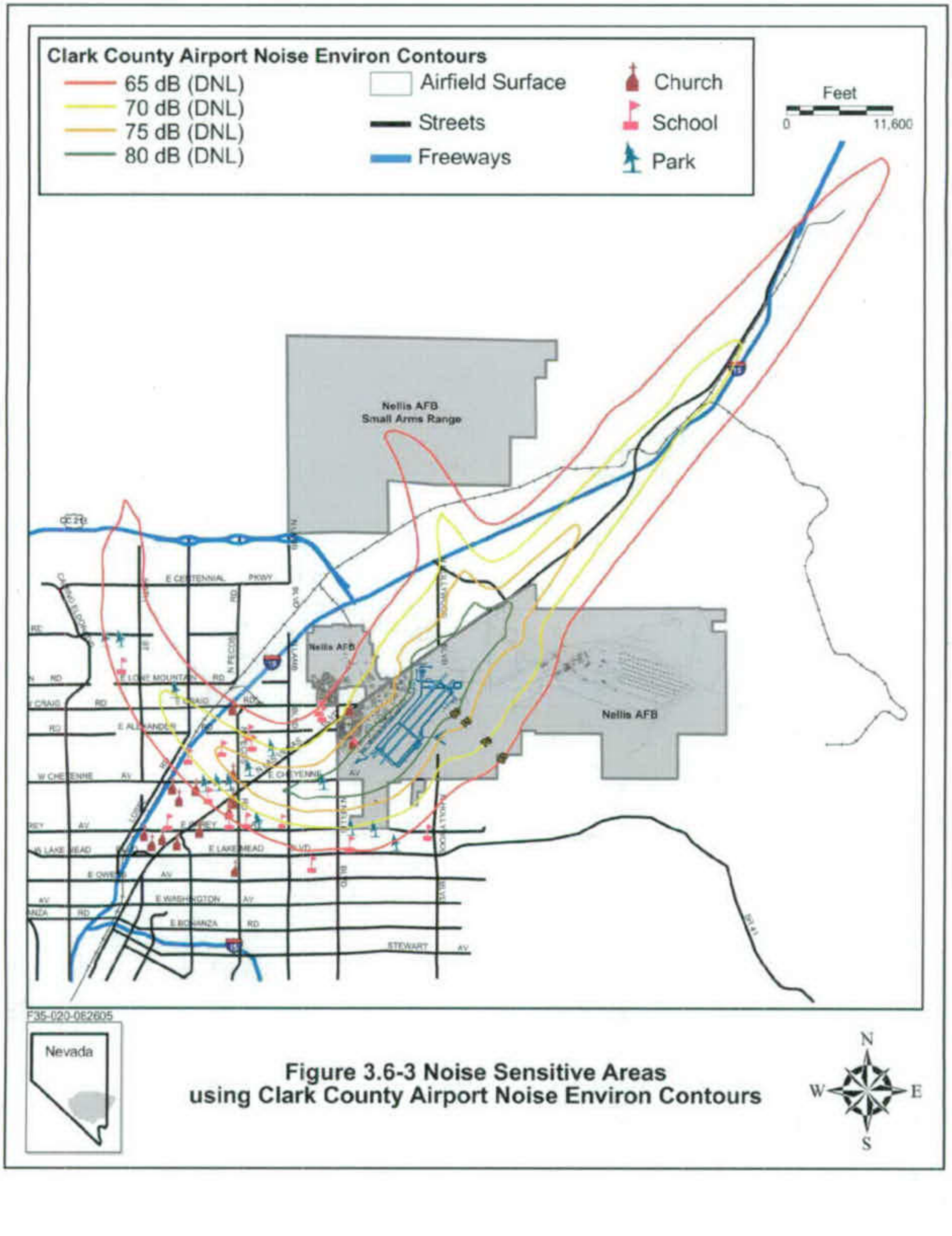


Figure 3.6-3 Noise Sensitive Areas using Clark County Airport Noise Environ Contours

Nellis AFB currently has a program to reduce noise over residential areas. Existing noise abatement procedures for flights over Sunrise Manor and North Las Vegas generally include the following:

- expedited climb to 6,000 feet MSL for fighter aircraft and 2,500 to 3,500 feet MSL for others;
- 60-degree banked right turn upon departure;
- a departure to the north before 9 a.m.;
- limiting arrivals and departures between 10 p.m. and 6 a.m. to mission essential aircraft; and
- practice takeoffs and landings scheduled between 6 a.m. and 10 p.m.

To the maximum extent possible, engine runup locations have been established in areas that minimize noise for people on base, as well as for those in the surrounding communities. Normal base operations do not include late-night engine runups, but heavy work loads or unforeseen contingencies sometimes require a limited number of night-time engine run-ups.

Nevada Test and Training Range

The NTTR consists primarily of the withdrawn lands and federal land managed by BLM for multiple use with additional areas managed by DOE, USFS, USFWS, the State of Nevada, and private individuals. Land uses on NTTR are discussed in the *Land Use Study for Nellis Air Force Range* (Air Force 1998a) and in the *Renewal of the Nellis Air Force Range Land Withdrawal Legislative Final EIS* (Air Force 1999b). Withdrawn lands within NTTR are managed by the Air Force, BLM, and USFWS. These lands were once used primarily for mining and some grazing, until establishment of the range in the 1940s. Since then, the land has been used for military purposes, although some mining and controlled recreational activities are permitted and continue to occur within the confines of the range. The land also provides habitat for wild horses, bighorn sheep, desert tortoises, and other wildlife species.

In accordance with the Federal Land Policy and Management Act (FLPMA) of 1976, NEPA, and Military Lands Withdrawal Act (MLWA) of 1999, the Department of Interior (DOI), through the BLM Las Vegas Field Office developed the *Nevada Test and Training Range Resource Management Plan and Final EIS* (BLM 2003) to guide management of BLM land comprising NTTR currently under Air Force stewardship. BLM's guiding principle of multiple use extends to the use of federal lands withdrawn for national defense and security, which, although not available for public use, remain under BLM's management. The NTTR plan guides management of the resources of approximately 2.2 million acres of public lands for the next 20 years (BLM 2003).

The Wild Horse and Burro Act of 1971 (16 U.S.C. 1331-1340), and regulations of the Secretary of the Interior (43 CFR Part 4700) place the responsibility for protection, management, and control of wild free roaming horses and burros with BLM when such animals use federal lands administered by BLM as all or part of their habitat. Wild Horse Herd Management Areas (HMAs) are special use land management areas established to maintain populations of wild horses. HMAs delimit areas within which specified numbers of wild horses are protected from overpopulation and harassment. Management tools include periodic monitoring of population numbers, water sources, distribution patterns, and the condition of adults and foals. In accordance with federal regulations, BLM (as the agency responsible for protection, management, and control of wild horses and burros using federal lands) with Air Force concurrence, established an HMA within the confines of NTTR to facilitate management of the wild horses that use land within the range (Figure 3.6-4). The HMA does not manage for wild burros, and few, if any, are found on NTTR. As part of the NTTR BLM Plan, it was decided that the appropriate management level of wild horses in the HMA would be adjusted to range from 300 to 500 in order to allow for a more equitable distribution of critical range resources between wildlife and wild horses (BLM 2003).

Noise levels in the Wild Horse HMA range between 51 and 60 L_{dnmr} at 200,000 sortie-operations and 53 and 62 L_{dnmr} at 300,000 operations. The lowest noise levels over the Wild Horse HMA are under R-4809: 51 L_{dnmr} at 200,000 sortie-operations and 53 L_{dnmr} at 300,000.

DNWR, also a special use land management area within NTTR, was originally established by Public Land Order 7373 in 1936 and became part of the National Wildlife Refuge System in 1976. As amended in 1966, it currently consists of approximately 1.6 million acres, with 826,000 acres withdrawn for military use. The DNWR is located within and adjacent to the southeastern area of NTTR. Its southernmost boundary is about one half mile from the city limits of Las Vegas. The DNWR falls under R-4808 and R-4806. Baseline noise levels for R-4808 are 45 L_{dnmr} based on 200,000 and 47 L_{dnmr} based on 300,000 sortie-operations. Noise levels for R-4806 are currently 55 L_{dnmr} based on 200,000 sortie-operations and 56 dB DNL at 300,000 sortie-operations. A Comprehensive Conservation Plan/Environmental Impact Statement for the DNWR is currently being developed for land management purposes; however, the draft document has not been published for public review.

All grazing rights or privileges within the joint-use area of DNWR have been eliminated through purchase or termination of permits. Use and public access to the joint-use area of DNWR and NTTR are restricted by a memorandum of understanding (MOU) between the Air Force and DOI and the MLWA of 1999. A description of wildlife resources and management within DNWR is provided in section 3.9, Biological Resources.

Most of the area under NTTR MOA airspace consists of federal lands managed by BLM. The BLM manages lands in units referred to as field offices and subunits of field stations. The NTTR MOAs encompass airspace over lands within the Las Vegas, Battle Mountain, and Ely Field Offices and the Tonopah and Caliente Field Stations in Nevada. A small portion of the MOAs overly the BLM Utah's Cedar City and St. George Field Offices and the Dixie National Forest. FLPMA requires each field office or station to develop and manage lands by use of a Resource Management Plan. In addition to the previously mentioned NTTR BLM Plan (BLM 2003), the Ely Field Office and the Caliente Field Station prepared the *Caliente Management Framework Plan* (BLM 2000). The Battle Mountain Field Office and

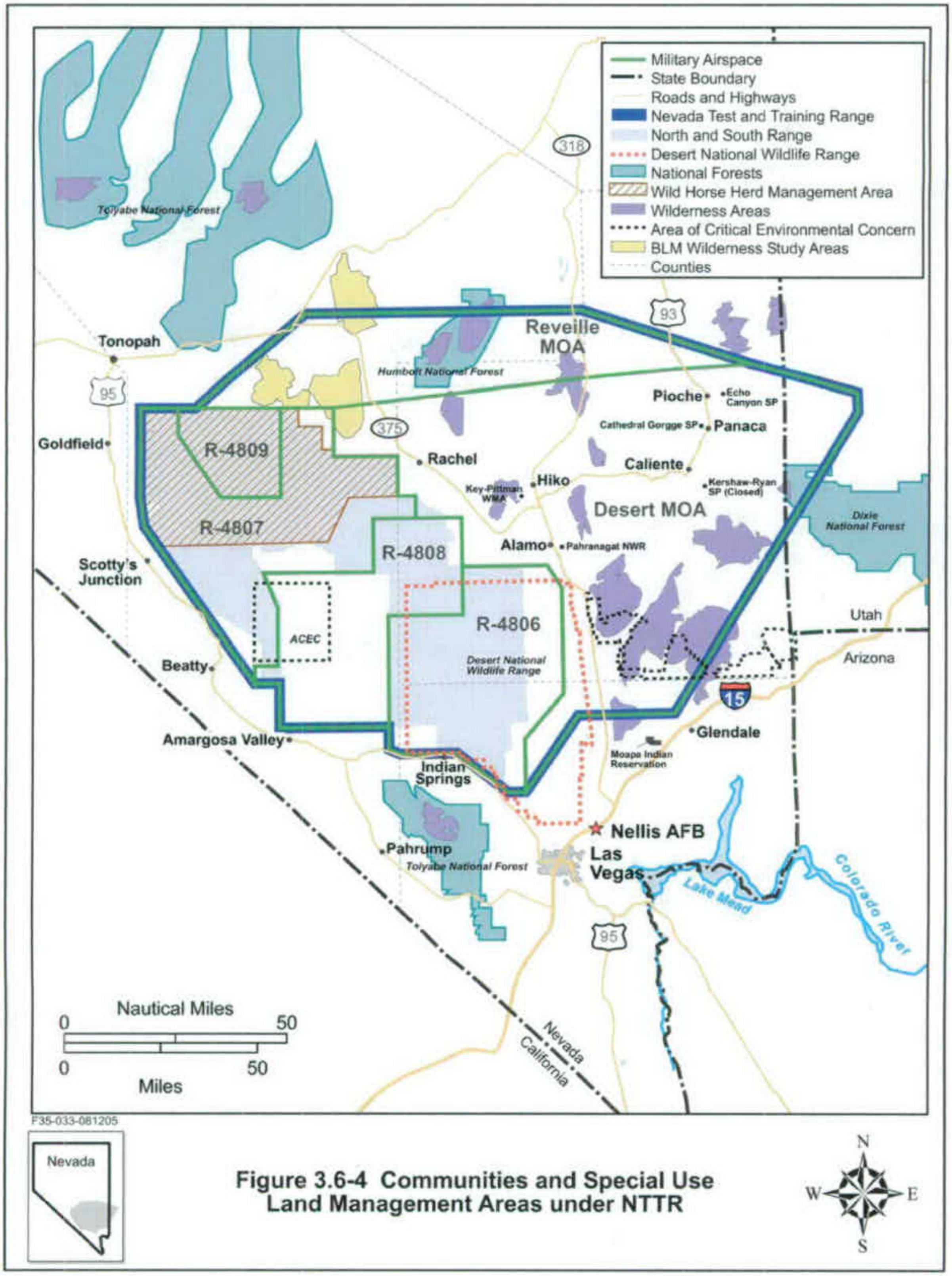


Figure 3.6-4 Communities and Special Use Land Management Areas under NTTR

Tonopah Field Station developed the *Tonopah Resource Area Management Plan and Record of Decision* (BLM 1997).

Currently, the management of these lands in Lincoln County is guided by the *Caliente Management Framework Plan,* which established guidelines for the classification of lands for multiple uses, including agriculture, residential, commercial, industrial, recreation, and public purposes (BLM 2000). In 2004, the Ely Field Office began a revision of the *Caliente Management Framework Plan,* the *Schell Management Framework Plan,* and the *Egan Resource Management Plan* to combine the documents guiding the management of resources throughout the planning area for their field office into one document. The final *Resource Management Plan/Environmental Impact Statement for the Ely Field Office, Nevada* was published in November 2007, and a Record of Decision is anticipated in early 2008. The revised plan continues to focus on multiple use but with a greater emphasis on sustainable yield for the district resources.

The Tonopah Resource Area includes 6.1 million acres of public land and approximately 165,000 acres of private land in Nye County. The *Tonopah Resource Area Management Plan and Record of Decision* (BLM 1997) provides a comprehensive framework for managing the public lands located in the Tonopah Resource Area for the next 15 to 20 years. Specific management objectives are provided within the plan for watershed, vegetation, visual resources, wildlife habitat, special-status species, riparian habitat, forestry and vegetative products, livestock grazing, wild horses and burros, forage allocation, cultural resources, lands and rights-of-way, Areas of Critical Environmental Concern (ACECs), recreation, wilderness, utility corridors, minerals, and fire management.

Among the special use land management areas of the BLM, ACECs are managed to preserve the uniqueness of the specific area. The characteristics of an ACEC may be unique geologic features, natural habitat, or cultural resources. The Timber Mountain Caldera ACEC is located under NTTR airspace and within DOE's NTS and was designated because of its unique geologic features. Kane Springs, Mormon Mesa, and Beaver Dam Slope ACECs are located under the Desert MOA and represent quality desert tortoise habitat. During the Resource Management Plan (RMP) process, the BLM Ely District proposes to add additional ACECs under the NTTR airspace. Management plans have not yet been developed but the Air Force and the BLM are working together on those ACECs which coincide with military operations.

Inclusion of land into the National Wilderness Preservation System is intended to preserve areas in a primitive state that possess little evidence of human activity. The Wilderness Act of 1964 identified criteria for evaluating areas for wilderness characteristics and gave direction on how designated wilderness areas should be managed. Subject to certain exemptions, use of motor vehicles or other motorized equipment, landing of aircraft, and construction of structures and roads are prohibited in wilderness areas. Each federal agency is responsible for evaluating, nominating, managing, and protecting designated and potential wilderness areas within the lands they manage.

The BLM, in accordance with Section 603(c) of FLPMA, reports to Congress on the federal lands under its management suitable for inclusion in the National Wilderness Preservation System. To accomplish this task, BLM inventoried and evaluated federal lands under its jurisdiction to determine areas suitable for wilderness designation. The result of the land inventory was the identification of a number of Wilderness Study Areas. The major factors evaluated for each Wilderness Study Area includes wilderness qualities such as naturalness, size, solitude, and special features; additional wilderness quality factors include multiple resource benefits, balancing the geographic distribution of wilderness areas, diversity of natural systems, and manageability (BLM 1997). BLM submitted recommendations for designation of these lands to the Secretary of the Interior for congressional action. In 2002, Congress passed the *Clark County Conservation of Public Land and Natural Resources Act of 2002* which designated 451,915 acres of wilderness of which the 27,530-acre Arrow Canyon Wilderness is under the NTTR airspace. In 2004, Congress passed the *Lincoln County Conservation, Recreation, and Development Act of 2004* which designated approximately 769,611 acres of wilderness and released 245,516 acres from Wilderness Study Area consideration. The area under NTTR airspace contains 14 wilderness areas and 3 Wilderness Study Areas (Table 3.6-7) with current noise levels between 51 and 59 L_{dnmr}.

Table 3.6-7 Wilderness Areas and Wilderness Study Areas Underlying NTTR MOA Airspace

Wilderness Area	***Acres***
Worthington Mountains	30,936
Weepah Springs	51,117
South Pahroc Range	25,638
Clover Mountains	85,757
Meadow Valley Range	124,833
Mormon Mountains	153,939
Tunnel Spring	5,530
Delamar Mountains	111,389
Arrow Canyon Range	27,530
Parsnip Peak	45,837
Big Rocks	13,913
Mt. Irish	31,088
Quinn Canyon Forest Service Wilderness	27,000
Grant Range Forest Service Wilderness	50,000
Wilderness Study Area	***Acres***
Kawich	54,320
South Reveille	33,000
Palisade Mesa	23,233

In 1975, the USFWS proposed approximately 88 percent of the DNWR for inclusion in the National Wilderness Preservation System. Areas excluded from the wilderness proposal included land on which NTTR target facilities are located; these are generally located in valleys below 4,000 feet (below 3,600 feet in Three Lakes Valley). The proposed wilderness area within DNWR is currently managed as wilderness so as not to impair its wilderness qualities. The USFS manages the Quinn Canyon and Grant Range wilderness areas in the Humboldt National Forest (refer to Figure 3.6-4)

Other federal lands underlying NTTR include the NTS, managed by DOE's National Nuclear Security Administration; portions of the DNWR; Pahranagat National Wildlife Refuge (NWR); as well as portions of the Humboldt and Dixie National Forests. Land use in the national forests consists of grazing, recreation, wildlife and wildlife habitat preservation, timber production, and mining (USFS 1985). The State of Nevada maintains two state parks and one state recreation area on lands under NTTR airspace. Noise levels in these areas range from 45 to 59 L_{dnmr}, but most areas experience noise levels around 53 to 56 L_{dnmr}.

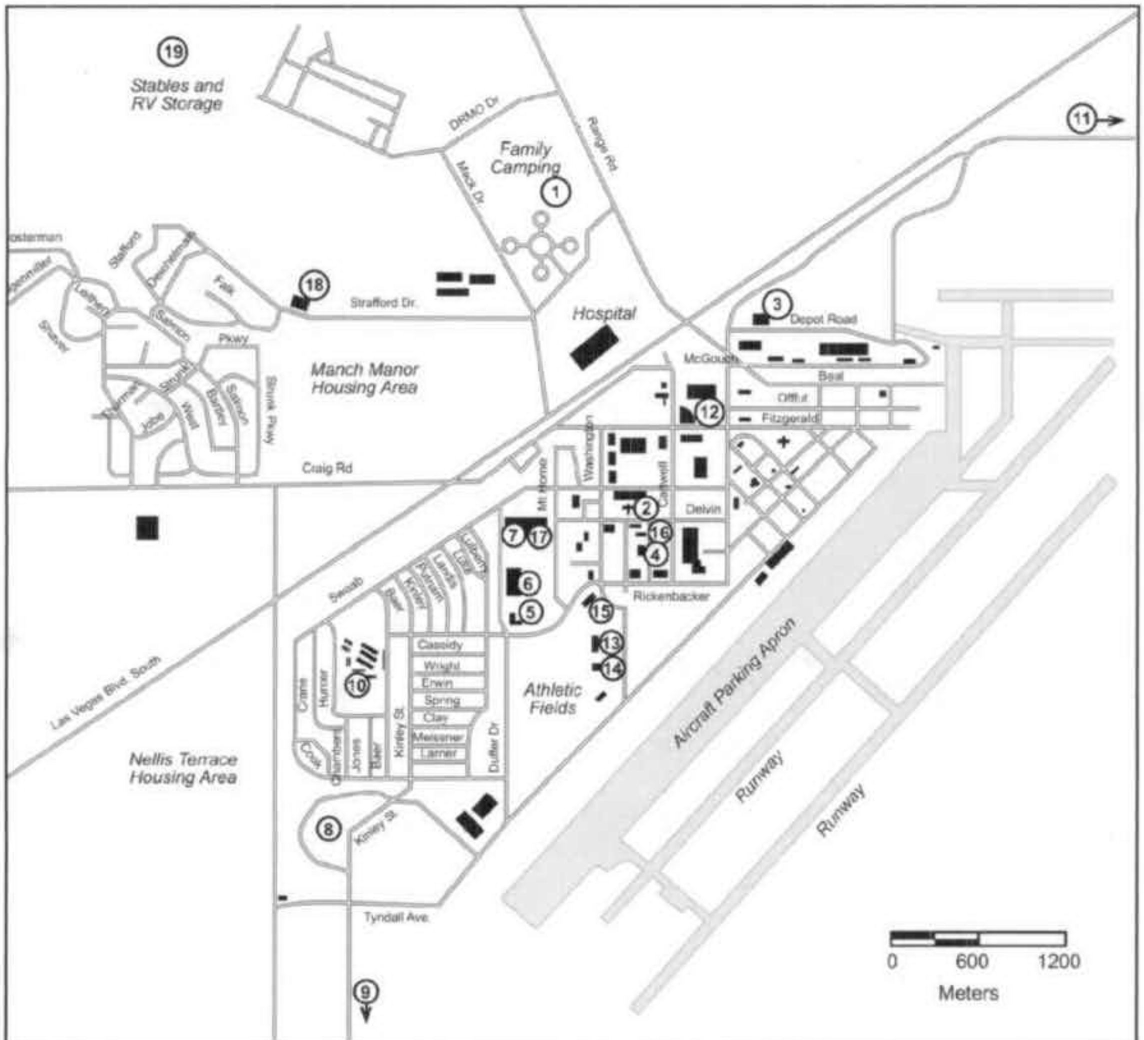
3.6.2 Recreation

Recreation resources include primarily outdoor recreational activities that occur away from a participant's residence. This section addresses natural resources and man-made facilities that are designated or available for public recreational use in both urban and rural areas. The setting, activity, and other resources that influence affected recreation resources are also considered.

The affected environment for recreation consists of lands on and adjacent to Nellis AFB and the lands under NTTR airspace. The analysis examined the effects of noise on recreation use at recreation areas surrounding Nellis AFB and on lands underlying NTTR. Potential recreation opportunities and sites were determined through informal consultation with the BLM and other land management agencies.

Nellis AFB

Recreational opportunities and facilities are an integral part of planning and development at all Air Force bases. At Nellis AFB, recreation facilities available to military personnel and their families include a variety of indoor and outdoor facilities (Figure 3.6-5). Indoor recreational facilities include a sport and fitness center, movie theater, bowling center, Child Development Centers I and II, a library, automotive skills center, and a youth center. The base also provides full service equipment rentals for on- and off-base recreation use. Outdoor recreation facilities, which occupy about 577 acres (4 percent of the total Nellis AFB land area), include an Olympic-sized swimming pool, Sunrise Vista Golf Course, tennis courts and athletic fields, lighted track at the "Runner's World" park, and Freedom Park, a large picnic and athletic facility. The Family Camp, a facility with recreational vehicle parking spaces and full service



1. Family Camping Area
2. Skills Development Center
3. Auto Crafts
4. Bowling Center
5. Child Development Center
6. Child Development Center II
7. Community Center
8. Freedom Park: Directional Overview
9. Golf Course Clubhouse
10. Lomie Heard Elementary School :(Nellis Terrace Housing Area)
11. Rod and Gun Country Club
12. Sports Pavilion
13. Olympic Pool
14. Outdoor Adventure
15. Sports and Fitness Center
16. Theater
17. Tickets & Tours
18. Youth Center
19. Stables and Recreational Vehicle Area

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Figure 3.6-5 Recreation Areas on Nellis AFB

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hookups, and equestrian facility are in Area III. Recreational opportunities are available in all three areas of the base, although most facilities, including the golf course and swimming pool, are in Area I.

Recreation facilities in the vicinity of the base are at neighborhood parks and schools. These facilities provide picnic areas and playing fields. A speedway is located along Las Vegas Boulevard in the vicinity of the base. Recreation programs such as climbing, horseback riding, and family fun centers are offered through both the cities of Las Vegas and North Las Vegas. Las Vegas Dunes Recreation Land is north of the base and provides all-terrain-vehicle riding and other motor sports.

Nevada Test and Training Range

Most of the land beneath NTTR MOA airspace, that is open to public recreation, is managed by the BLM for multiple use, which includes recreation. Access by the public to the NTTR withdrawn lands is prohibited with the exception of limited hunting which is allowed under permit conditions and existing MOUs. All target and weapons safety footprint areas are controlled by range and recreational personnel per AFI 13-212. Hunting on NTTR is coordinated with the Nevada Department of Wildlife (NDOW) and USFWS.

Numerous broad valleys separate the north-south trending mountain ranges within and surrounding NTTR. The diverse landscape provides a variety of outdoor recreation opportunities ranging from hiking, camping, and nature viewing to off-road vehicle use, mining, and hunting. State parks, recreation areas, national forests, and wildlife refuges are also destinations for visitors.

Hunting occurs within portions of the DNWR (managed by the USFWS) and NDOW manages game animals within the state. Bighorn sheep, elk, mule deer, antelope, and upland game (grouse, chukar, quail pheasant, dove, rabbits, etc.) are hunted throughout the area.

Due to the dispersed nature of primitive recreation, accurate recreation usage is difficult to measure. Many activities such as camping and hiking do not require special permits, so visitors often are not precisely counted. The BLM Ely Field Office and the Caliente Field Station Office manages the majority of land under the associated airspace. The *Caliente Management Framework Plan* (BLM 2000) identified areas where recreation use is a concern due to unique or special attributes such as botanical, zoological, geological, and paleontological values. These areas are Ash Springs, Clover Creek, Gleason Canyon, Ella Mountain Summit, Panaca Charcoal Kilns-Panaca Summit, Oak Springs Summit, and Hancock Summit (Figure 3.6-6). The Tonopah Resource Area is under the northwest portion of the associated airspace. Recreation use for the entire Tonopah area was approximately 175,000 visitors in 2005 (personal communication, Fisher 2006). Wilderness Areas and Wilderness Study Areas are located throughout these lands and provide primitive recreation opportunities.

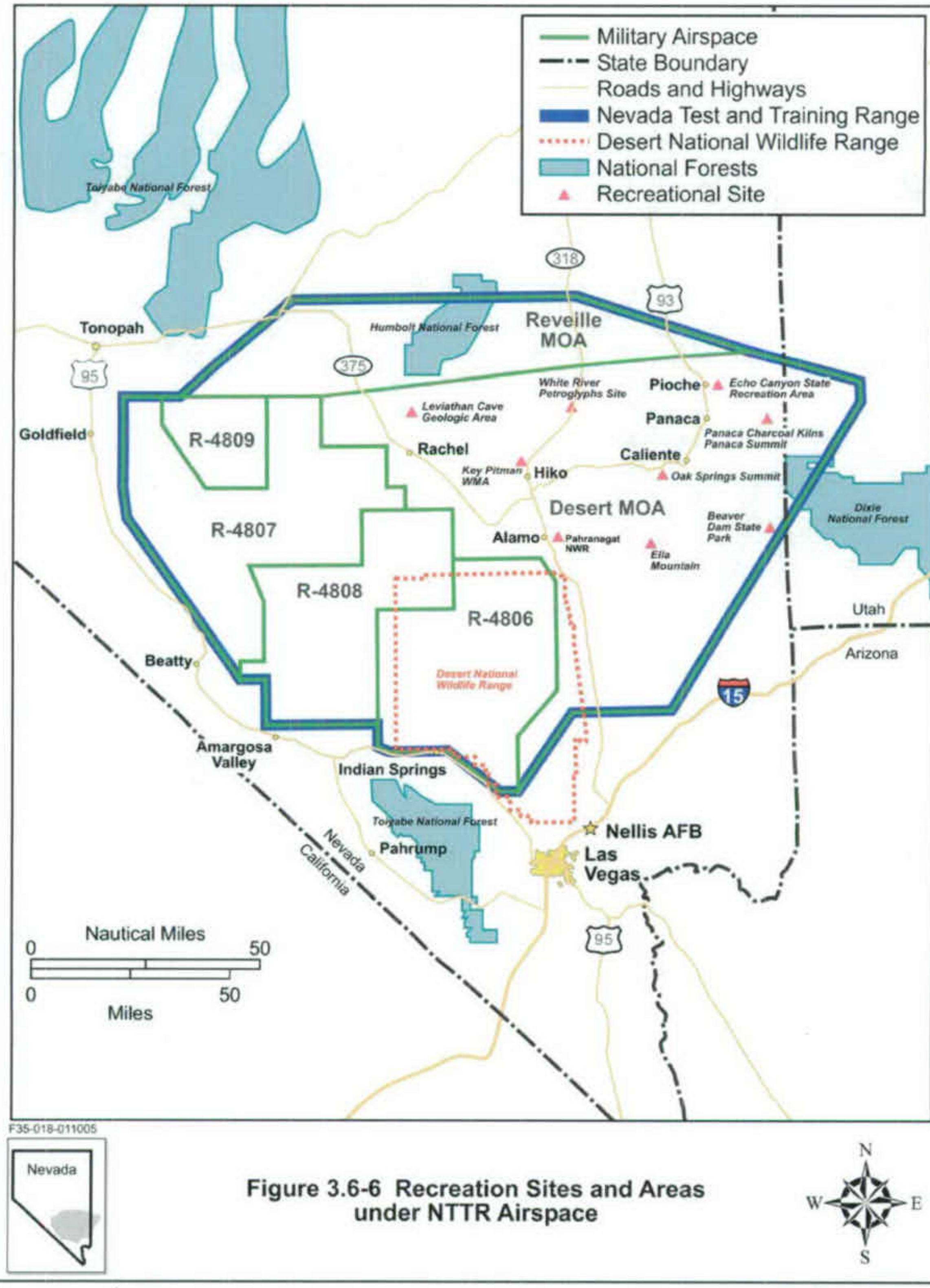


Figure 3.6-6 Recreation Sites and Areas under NTTR Airspace

Small portions of two national forests, Dixie and Humboldt, are located under NTTR airspace. Both offer picnicking, camping, and hiking in rugged mountainous terrain. Cathedral Gorge State Park, Beaver Dam State Park, and Echo Canyon State Recreation Area are located under the northeast portion of NTTR airspace. Each of these areas offers camping, picnicking, and hiking in a scenic location. Beaver Dam State Park and Echo Canyon State Recreation Area also offer fishing and water skiing. Current noise levels in these areas range from 54 to 59 L_{dnmr}.

Other areas also attract visitors because of their distinctive attributes: the Key Pittman Wildlife Management Area (WMA), Pahranagat NWR, White River Petroglyphs Archaeological Site, and Leviathan Cave Geologic Area. Ghost towns under NTTR MOAs exhibit various states of disrepair, but also attract visitors. Usually these sites contain a few buildings or foundations of buildings. Some also have cemeteries, mine tailings, and other evidence of historic mining. Historic ghost towns and mining camps are further discussed in section 3.10, Cultural Resources.

NWRs are designated and managed by USFWS to "preserve a national network of lands and waters for the conservation and management of fish, wildlife, and plant resources of the U.S. for the benefit of present and future generations." The Pahranagat NWR and Key Pittman WMA underlie NTTR airspace. Noise levels range from 57 to 59 L_{dnmr}.

Sections of privately owned land also occur under NTTR airspace in and around communities including Alamo, Hiko, Caliente, Panaca, Pioche, and others. A planned development in Coyote Springs is also east of NTTR ranges (refer to Figure 3.6-4). Baseline noise levels in these areas range from 57 to 59 L_{dnmr}.

3.7 SOCIOECONOMICS AND INFRASTRUCTURE

Socioeconomics is defined as the social and economic activities associated with the human environment, particularly population and economic activity. Economic activity typically includes employment, personal income, and industrial growth. Impacts on these two fundamental socioeconomic indicators can also influence other components such as housing availability and public services.

Socioeconomic data are presented at the county level in order to analyze baseline socioeconomic conditions in the context of county trends. Data have been collected from previously published documents issued by federal, state, and local agencies; from state and national databases (e.g., U.S. Census Bureau (USCB); University of Nevada Center for Business and Economic Research; and from Nellis AFB (e.g., the base's Public Affairs Office).

Analyses of impacts to socioeconomic characteristics potentially resulting from implementation of the proposed action requires establishment of an affected environment–a primary geographical area within which direct and indirect socioeconomic effects of the F-35 FDE program and WS beddown would be noticed. Because direct socioeconomic effects associated with implementation of the proposed beddown would occur in the immediate vicinity of Nellis AFB and since infrastructure resources are generally influenced by the socioeconomic environment, the primary focus of this analysis is Clark County.

3.7.1 Population

Clark County is the most populous of Nevada's 17 counties. Based on census data compiled over the past 15 years, it is the fastest growing metropolitan county in the United States, having increased in population from about 741,500 people in 1990 to 1,375,765 people in 2000, an increase of approximately 86 percent (USCB 2006a). As of July 2005, the population of Clark County was estimated to have grown to approximately 1,691,213 people representing a 23 percent increase since 2000. By comparison, the State of Nevada increased 19 percent during the same period (USCB 2006b).

3.7.2 Employment and Earnings

Clark County employment sectors with the greatest number of jobs in 2005 included services, retail trade, government and government enterprises, and construction (USCB 2006b). Government and government-related enterprises comprise federal civilian, military, and state- and local-government employment.

Nellis AFB is among the area's largest employers with a workforce that totaled 12,284 personnel in 2006 (Air Force 2006a). Personnel included 8,615 active duty military, 2,746 non-appropriated contract civilians and private business employees, and 923 appropriated civilians. The total annual payroll expenditures in 2006 were more than $857 million. Further, the Air Force estimates that the economic stimulus of Nellis AFB created approximately 5,386 secondary jobs in the civilian economy generating over $191 million in the local region. Nellis AFB also purchased considerable quantities of goods and services from local and regional firms. Construction costs, service contracts, and materials, supplies, and equipment for the base totaled over $2.6 billion. In total, Nellis AFB contributed over $4.2 billion to the local economy in 2006. Also generating substantial economic activity are over 27,500 military retirees who receive and spend payrolls exceeding $519 billion in the region (Air Force 2006a). As one of the single largest government employers in Clark County, Nellis AFB and its continuing operations represent a significant source of regional economic activity.

One of the continually growing employment sectors in Clark County is construction. Rapid growth in regional population in the past 15 years is the cause of the continued growth in the construction industry. Recent data indicate that although population growth has slowed in the past 5 years; however, construction employment continues to grow (UNLV 2006). In the 5-year period between 2000 and 2005, the population in the Clark County increased 23 percent while the number of employed persons grew by nearly 19 percent (USCB 2006b). In 2006, the construction industry in Clark County gained 11,100 jobs; however residential and commercial construction permits dropped resulting in a 5 percent decrease in construction growth over the previous year (UNLV 2006).

3.7.3 Infrastructure

Housing

Since Clark County is one of the fastest growing county in the United States, this rapid population growth also includes a corresponding increase in the demand for affordable, quality housing in the region. The housing stock in Clark County increased 28 percent from 559,799 units in 2000 to 718,358 units in 2005 (USCB 2006c, d). Over the period 2003 to 2005, an average of 14,112 building permits for residential and apartment buildings were issued annually. Single family residences accounted for 92 percent of the residential and apartment buildings permits issued during the 2003 to 2005 period (Clark County 2006a). The housing vacancy rate for Clark County was approximately 3.5 percent in 2005 (USCB 2006c).

Currently, housing on Nellis AFB is available in military family housing units, dormitories, and billeting facilities. A total of 1,224 two-, three-, and four-bedroom homes are currently available to Nellis AFB personnel and their families with an occupancy rate of 98 percent. An additional 1,074 beds are available in 13 base dormitories; however, one dormitory is currently undergoing renovation. The current occupancy rate is 92 percent (personal communication, Perez 2007). Billeting facilities are also available for families (60 units), visiting airmen, and visiting officers. In 2006, approximately 2,201 military personnel lived on Nellis AFB; approximately 6,414 military personnel relied on off-base housing (Air Force 2006a).

Nellis AFB has transferred ownership of the military family housing units to a private developer under a lease agreement. The developer will demolish 951 units, construct 851 new units, and renovate 350 existing units with military construction funding. The construction and renovation activities in are expected to be complete in 2011. When complete, a total of 840 two- and three-bedroom homes and 338 four-bedroom homes will be available to Nellis AFB military families, for a combined total of 1,178 housing units (Air Force 2005d).

Public Schools

Public school district boundaries in southern Nevada correspond with county boundaries (i.e., the Clark County School District includes all public schools located within the geopolitical boundaries of Clark County). As the overall population of the affected environment continues to increase, there has been a corresponding increase in enrollment and construction of new schools. At the start of the 2006/2007 school year, a total of 326 public schools were operating in the Clark County School District with an estimated enrollment of 302,773 students (Clark County 2006b). The Lomie G. Heard Elementary School is the only school on Nellis AFB. The school, which is included in the Clark County School District, accommodates about 800 students. The base has two child development centers with sufficient capacity to accommodate a combined total of about 490 children per day (personal communication, Omohundro 2005).

While a large federal installation such as Nellis AFB contributes greatly to the local economy, it also removes a large tax base used to supplement education costs such as purchase of textbooks, computers, utilities, and teacher and administrative staff salaries. Impact Aid is a federal program that provides funding for a portion of the educational costs of U.S. military dependents. The program essentially pays a tax bill directly to a local school district due to the presence of a military installation. To qualify for the Impact Aid, a school district must have at least 400 federal students in their average daily attendance or at least 3 percent of all children in the school district's average daily attendance must be federally-connected. The amount of Impact Aid varies depending on whether the military family resides on the installation or off base in the local community. The Clark County School District meets the qualifications for federal Impact Aid.

Utilities

Electric Power and Natural Gas

The Nevada Power Company, a subsidiary of Sierra Pacific Resources, provides the majority of electric power to the base. A small percentage of electrical power generated by the Hoover Dam is provided to Nellis AFB by Western Area Power Administration (personal communication, Blazi 2006). Power is distributed throughout the base via 718,319 linear feet of above-ground cable, and another 1,175,415 linear feet of underground cable. Pole and pad-mounted transformers step down the 12.47 kilovolts power to the voltages that are required by the various facilities. Nellis AFB has indicated that the electrical system needs to be upgraded to provide future projected demand (Air Force 2002a). The Southwest Gas Company provides natural gas to Nellis AFB. The Southwest Gas Corporation supply line distributes gas to areas of the base via 206,000 linear feet (almost 40 miles) of polyethylene pipelines. The base maintains three 1,000-cubic-foot cylinder tanks of natural-gas storage to refuel government vehicles. Gas supply is adequate to meet existing and projected demand (Air Force 2002a).

Potable Water

Nellis AFB's potable water sources include five government-owned and operated wells and water purchased from Southern Nevada Water Authority via bulk-supply pipelines from Lake Mead. A small quantity is also purchased from the City of North Las Vegas Water District. Nellis AFB is allotted 7.1 million gallons per day (gpd) of surface and ground water (personal communication, Roe 2007). The total existing potable water storage is 7.5 million gallons. Nellis AFB average daily water usage varies between 2.5 million gpd in between October and April to 5.4 million gpd from May to September (Air Force 2002a).

Wastewater Treatment

Nellis AFB discharges approximately 1.5 million gpd of sanitary sewage from the base to the Clark County Water Reclamation District (CCWRD) for treatment. This equates to about 90 to 95 percent of the base sanitary sewage. Industrial wastewater (i.e., aircraft wash water) from the flightline is also discharged through the sanitary sewer system to the CCWRD for treatment with the sanitary wastewater (Air Force 2002a). CCWRD treats 170 million gpd at several facilities; the Main Facility services Nellis AFB's wastewater. The Main Facility's capacity of 96 million gpd is currently being upgraded to 110 million gpd (CCWRD 2007). The treated sewage is released into the Las Vegas Wash where it flows underneath Lake Las Vegas eventually emptying into Lake Mead (Air Force 1999b).

Transportation

Transportation resources refer to the infrastructure and equipment required for the movement of people, raw materials, and manufactured goods in geographic space. Particular emphasis for this analysis is given to the road networks. Transportation resources were analyzed on Nellis AFB only. Since no effect to transportation was expected due to overflights and noise, no further analysis of transportation resources in NTTR was conducted.

For transportation resources, the affected environment includes the roadway network on Nellis AFB, and those roads likely to be used for base access. Nellis AFB is near several major highways. Regional access to the base is provided by Interstate 15 (I-15) via exits at Craig Road from the west, Las Vegas Boulevard from the north, and Nellis Boulevard to the south. From the base, I-15 may be reached via Craig Road or Las Vegas Boulevard; the Craig Road intersection with I-15 is the interchange closest to the base, located approximately 2.5 miles west of the main gate. Cheyenne Avenue intersects I-15 approximately 4 miles west of the base and ends at the base's southwest boundary, near the base golf course.

The roads within Nellis AFB form a network independent from the surrounding vicinity. A 2006 traffic study (Air Force 2006b) investigated the general traffic flow throughout Nellis AFB and looked specifically at 16 intersections and 10 areas of the base that have potential traffic congestion or safety issues. Traffic counts were taken at these intersections at peak periods to establish base traffic demand. Data were used to evaluate and quantify existing traffic problems. The study indicated numerous intersections of particular concern to warrant either a signal light, roundabout, or realignment: the intersections of Beale and Ellsworth Avenues; four intersections along Washington Boulevard; Ellsworth Avenue and Fitzgerald Boulevard; Tyndall Avenue, March Boulevard, and Delvin Drive; Duffer Drive and Rickenbacker Road; Tyndall Avenue and Kinley Avenue; and Hollywood Road. The study also revealed traffic delays at the Main Gate at the intersections of Fitzgerald Boulevard, Las Vegas Boulevard, and Craig Road and at the Tyndall Gate at the intersection of Tyndall Avenue, Nellis Boulevard, and Gowan Road. This study concluded that adverse transportation conditions exist at the Tyndall Gate and recommended retiming of the existing signal light. The remainder of the traffic issues can be resolved by better usage of lanes, signs, and crosswalks, according to the study.

3.8 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

In 1994, Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, was issued to focus attention of federal agencies on human health and environmental conditions in minority and low-income communities and to ensure that disproportionately high and adverse human health or environmental effects on these communities are identified and addressed. To provide a thorough environmental justice evaluation, this section gives particular attention to the distribution of race and poverty status in areas potentially affected by implementation of the proposed action. For this analysis, minority and low-income populations are defined as follows:

- ***Minority Populations***: Persons of Hispanic origin of any race; African Americans; American Indians, Eskimos, and Aleuts; and Asians or Pacific Islanders.
- ***Low-Income Populations***: Persons living below the poverty level, based on a total annual income of $20,000 for a family of four as reported in the *2006 Federal Poverty Guidelines* (U.S. Department of Health and Human Services).

Estimates of these two population categories were based on data from the 2000 census (the most comprehensive dataset for population statistics) and 2005 population estimates for Clark County. Although the census does not report minority population as a class, it reports population by race and ethnic origin. These data were used to estimate minority populations potentially affected by implementation of the proposed action.

In 1997, Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks (Protection of Children)*, was issued to ensure the protection of children. Socioeconomic data specific to the distribution of population by age and the proximity of youth-related developments (e.g., day care centers and schools) that could potentially be incompatible with the proposed action is presented. Data used for protection of children analysis were also collected from the *2000 Census of Population and Housing* (USCB 2006b).

The analysis of environmental justice considers changes in airfield noise levels created by the proposed action for the base and vicinity but not areas near NTTR or under the airspace. The existing area affected by noise levels of 65 DNL or greater for which population could be affected overlies land areas on Nellis AFB in Clark County. Baseline noise contours used are found in section 3.3 and are illustrated on page 3.3-7, Figure 3.3-1.

Nellis AFB

Minority and Low-Income Populations

Although open land makes up the largest percentage of lands affected by noise, residential areas (i.e., homes) to the west of Nellis AFB are also affected. Existing land use in the vicinity of Nellis AFB currently affected by aircraft noise is discussed in detail in section 3.6.

While no residential areas are located within clear zones associated with Nellis AFB, substantial tracts of residential land are located within APZs I and II and have been located within these areas since before 1992. Over at least the last two decades, residential and other incompatible land uses have been permitted within areas adjacent to Nellis AFB that are subjected to noise levels greater than 65 DNL. Clark County zoning ordinances have restricted land uses in these areas; however, encroachment by residential development continues to be a problem. One community that continues to be affected by noise resulting from Nellis AFB activities is Sunrise Manor, an unincorporated town. Portions of Sunrise Manor are immediately west and south of Nellis AFB.

Table 3.8-1 displays the total population, total minority population, percentage minority, total low-income population, and low-income percentages for the affected areas in the vicinity of Nellis AFB with baseline noise greater than 65 DNL. Minority and low-income populations in the affected areas are then compared with the total population of Clark County. The information presented is derived from the *2000-2005 Poverty Estimates and Southern Nevada Consensus Population Estimate and 2005 Population Estimates* (USCB 2006a, c). This is the latest source of information containing data at the required level of detail regarding minority and low-income population groups.

Table 3.8-1 Minority and Low-Income Populations in the Vicinity of Nellis AFB in Clark County with Baseline Noise Greater than 65 DNL

DNL	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*
65 - 70	32,644	15,499	47%	5,273	16%
70 - 75	15,568	5,812	37%	2,436	16%
75 - 80	2,596	766	30%	280	11%
80 - 85	142	41	29%	15	11%
> 85	0	0	0	0	0
Total	**50,950**	**22,118**	**43%**	**8,004**	**16%**

Source: USCB 2006b – based on 2005 Population Estimates and 2000-2005 Poverty Estimates and Southern Nevada Consensus Population Estimate, July 2005.

Clark County	
Total 2005 Population	1,691,213
Minority	458,004
Low-Income	147,136

Source: USCB 2006b

In the area surrounding Nellis AFB, approximately 50,950 people were estimated to be affected by current noise levels above 65 DNL in 2005. Out of that total, roughly 43 percent are considered to be minorities, and 16 percent have low-incomes. The percentage of minority populations currently affected by noise exceeds the 27 percent minority average in Clark County as a whole. In addition, the percentage of low-income population affected by noise in 2005 exceeds the 8.7 percent low-income average in Clark County as a whole.

Protection of Children

In 2005, the number of Clark County residents estimated to be under the age of 18 was 447,212 representing approximately 26 percent of the total population (USCB 2006b). Residential development exists in the vicinity of Nellis AFB within areas exposed to unacceptable noise levels (see Figure 3.3-1) and in established APZs (see Figure 3.5-1). Encroachment in the APZs by residential development continues despite ordinances restricting certain land uses.

The Nellis Terrace Housing Area and Lomie G. Heard Elementary School, both located in Area I of the base, are subject to 70 DNL and higher noise levels. No environmental restoration sites occur at locations on the base where they could pose a potential health risk to affected groups of children.

3.9 SOILS AND WATER RESOURCES

The principal factors influencing stability of structures are soil and seismic properties. Soil, in general, refers to unconsolidated earthen materials overlying bedrock or other parent material. Soil structure, elasticity, strength, shrink-swell potential, and erodibility all determine the ability for the ground to support structures and facilities. Relative to development, soils typically are described in terms of their type, slope, physical characteristics, and relative compatibility or limitations with regard to particular construction activities and types of land use.

Water resources include surface and ground water. Lakes, rivers, and streams comprise surface water resources that are important for economic, ecological, recreational, and human health reasons. Groundwater is used for potable water consumption, agricultural irrigation, and industrial applications. Groundwater properties are often described in terms of depth to aquifer, aquifer or well capacity, water quality, and surrounding geologic composition. Attributes of water resources considered in this EIS include hydrologic setting, availability, use, quality (including protection zones), floodplains, flood hazard, and adjudicated claims to water rights for both surface and groundwater. The Clean Water Act (CWA) of 1972 is the primary federal law that protects the nation's waters, including lakes, rivers, and aquifers. The primary objective of the Act is to restore and maintain the integrity of the nation's waters. Jurisdictional waters of the U.S. are regulated resources and are subject to federal authority under Section 404 of the CWA. This term is broadly defined to include navigable waters (including intermittent streams), impoundments, tributary streams, and wetlands.

Criteria for water quality within the State of Nevada are contained in the Nevada Administrative Code (NAC), Chapter 445A.119, and apply to existing and designated beneficial uses of surface water bodies. Water quality standards are driven by the beneficial uses of specific water bodies. Beneficial uses include agriculture (irrigation and livestock watering), aquatic life, recreation (contact and non-contact), municipal or domestic supply, industrial supply, and wildlife propagation.

The State of Nevada has adopted drinking water standards established by the EPA, under the Safe Drinking Water Act. The Nevada Department of Health regulates drinking water quality for public supply systems. Drinking water standards consist of maximum contaminant levels established for various water quality constituents to protect against adverse health effects.

General soils and water information pertains to all areas where proposed F-35 construction projects would occur. All areas are located within the southern Las Vegas sub-basin of the Great Basin, the northernmost subprovince of the Basin and Range Physiographic Province. This province is generally characterized by regularly spaced, north-south trending mountain ranges that are separated by internally-draining alluvial basins or playas. The elevations of mountains and intervening valleys generally increase from south to north. The physiographic Great Basin subprovince overlaps all of the ecological Great Basin Desert and extends farther in a few locations in northeastern California and southeastern Oregon and in southern Nevada near Las Vegas and Lake Mead. With the exception of the Lake Mead area, the Great Basin subprovince drains internally; precipitation has no surface water outlet to the Pacific Ocean.

The Sierra Nevada mountains, stretching along Nevada's western border, interrupts the prevailing easterly flow of storm systems and minimizes precipitation, resulting in a "rain shadow." Surface water is sparse in Nevada. Typically, as much as 75 percent of Nevada's precipitation falls during the winter. The scarcity of surface water resources is attributed to a dry regional climate characterized by low precipitation, high evaporation, low humidity, and wide extremes in daily temperatures. Average precipitation depends mainly on elevation and ranges from 4 inches on the desert floor to 16 inches in the mountain areas. With the exception of locally intense thunderstorms that can produce flash flooding, much of the warm weather precipitation is lost to the atmosphere through evaporation and transpiration. Flash floods produce high peak flows over short periods of time.

Nevada's groundwater is typically found in unconsolidated deposits of sand, gravel, silt, and clay that partly fill the many basins. Most groundwater development is in basins where water is readily obtained from shallow unconsolidated deposits where well yields are more predictable than in the mountains. Groundwater use has been discussed previously in section 3.7.

Because direct effects to soil and water resources associated with implementation of the proposed F-35 FDE and WS beddown would occur at and near Nellis AFB and since no new construction would occur on NTTR, the focus of this analysis is Nellis AFB.

3.9.1 Soils

Nellis AFB is located in the southern part of the Las Vegas Valley. The elevation of Nellis AFB is about 2,000 feet above sea level. The ground surface over most of Nellis AFB is disturbed by man-made features, such as airfields, roads, and buildings. Nellis AFB is relatively flat; over most of the base, including the vast majority of the developed areas, slopes are 1 percent or less.

Nellis AFB lies primarily on two types of soil, the Las Vegas-Destazo complex and the Las Vegas-Skyhaven complex (USDA 1985). These soils are very similar physically and chemically. Las Vegas soils comprise 60 percent of Nellis AFB soils and Skyhaven and Destazo soils together comprise 25 to 30 percent, leaving 10 to 15 percent McCarran-Grapevine complex, Weiser-Goodsprings complex, and Glencarb silt loam. The main soil types share the following attributes:

- moderately slow permeability;
- slight potential for water erosion;
- high potential for wind erosion; and
- a shallow hardpan layer that limits construction.

These attributes indicate that ground disturbance at Nellis AFB, such as construction, could lead to a high degree of wind erosion. Erosion from precipitation and runoff is rare, due to soil characteristics, lack of slope on Nellis AFB, and minimal amounts of precipitation.

3.9.2 Water Quality and Stormwater

The Las Vegas Valley extends in a northwest-southeast direction and drains toward the south through the Las Vegas Wash into Lake Mead. Nellis AFB lies in the southern portion of the Las Vegas Valley within the Colorado River Basin. Natural surface waters and perennial streams are nonexistent. No 100-year floodplains occur within the developed portions of the base. The little precipitation that is captured is drawn into the valley's principal basin-fill aquifer, shallow aquifers, and the Colorado River.

Nellis AFB is underlain by carbonate rock aquifers of the Death Valley and Colorado aquifer systems (USGS 1997), which are hydrologically connected to shallower alluvial aquifer systems composed of sand and gravels. The principal aquifer in the Las Vegas Valley hydrologic basin is naturally recharged by 30,000 to 35,000 acre feet per year (afy) mostly from the Spring Mountains on the west valley boundary. Recharge of the shallow aquifers is also occurring, primarily as a result of irrigation water percolating into the ground.

Surface water is transported to Nellis AFB by pipelines from Lake Mead. No natural lakes or other open bodies of water, excluding manmade impoundments, are found on Nellis AFB. A few ephemeral streams occur on base (personal communication, Roe 2007), particularly in Area II. However, low precipitation, a lack of slope, and the absence of streams create a context where the potential for water erosion is rare.

Sources of groundwater are available from the principal alluvial-fill aquifer underlying the Las Vegas Valley. In addition to the on-base well, wells occur in both the northwest part of the valley from the Las Vegas Valley Water District/Southern Nevada Water Authority and in the northern end of the valley from North Las Vegas Water District. The existing water supply at Nellis AFB is considered adequate (Air Force 2002a).

Piped surface and ground waters support base personnel and operations. This includes water for drinking and sewage systems, fire utilities, maintaining landscapes, and construction. Nellis AFB drinking water standards are established by the EPA under the Safe Drinking Water Act, also adopted by the State of Nevada. Drinking water quality for public supply systems is regulated by the Nevada Department of Health. Maximum contaminant levels have been established for various water quality constituents to protect against adverse health effects. All water sources for Nellis AFB meet EPA and State of Nevada standards.

Nellis AFB's potable water sources include five active government-owned and operated wells and water purchased from Southern Nevada Water Authority via bulk-supply pipelines from Lake Mead. The base also purchases a small quantity from the City of North Las Vegas Water District. Approximately 29 percent of the Nellis AFB water supply comes from groundwater, and the base is allotted 7.1 million gdp of surface and ground water (personal communication, Roe 2007). Nine storage tanks for potable water exist at Nellis AFB, with a total existing potable water storage capacity of 7.5 million gallons. Nellis AFB's average daily water usage varies between 2.5 million gpd between October and April to 5.4 million gpd from May to September (Air Force 2003a).

Stormwater runoff on Nellis AFB is drained by three outfalls: one each in Area I, Area II, and Area III. Outfall 001 in Area I drains the main base; the discharge is diverted through channels to the Las Vegas Wash which eventually flows into Lake Mead. The drainage area of Outfall 001 includes about 44,000 acres of off-base and 10,760 acres of on-base property. Outfalls II and III consist of small brooks and swales which drain the eastern portion of the WSA and a small portion of the Defense Reutilization and Marketing Office (DRMO) (Air Force 2002a).

Under the CWA, facilities that discharge stormwater associated with industrial activity must apply for a stormwater permit; the State of Nevada is the EPA-designated permitting authority. Nellis AFB has authorization under a NDEP General Permit No. NVR050000 to discharge its stormwater through the base's three outfalls. NDEP does not require NTTR to perform stormwater sampling (Air Force 2002a).

3.10 BIOLOGICAL RESOURCES

Biological resources encompass plant and animal species and the habitats within which they occur. Plant species are often referred to as vegetation and animal species are referred to as wildlife. Habitat can be defined as the area or environment where the resources and conditions are present that cause or allow a plant or animal to live there (Hall *et al.* 1997). Biological resources for this EIS include vegetation, wetlands, wildlife, and special-status species occurring in the vicinity of the proposed construction projects on Nellis AFB and in NTTR where they could be potentially affected by noise generated from overflights.

Vegetation. Vegetation includes all existing upland terrestrial plant communities with the exception of wetlands or special-status species. The affected environment for vegetation includes those areas subject to demolition and construction ground disturbance.

Wetlands and Jurisdictional Waters of the United States. Wetlands and jurisdictional waters of the U.S. are considered special category sensitive habitats and are subject to regulatory authority under Section 404 of the CWA and Executive Order 11990 *Protection of Wetlands.* They include jurisdictional and non-jurisdictional wetlands. Jurisdictional wetlands are those defined by the United States Army Corps of Engineers (USACE) and EPA as those areas that meet all the criteria defined in the USACE's 1987 *Wetlands Delineation Manual* and under the jurisdiction of the USACE (USACE 1987). Wetlands are generally associated with drainages, stream channels, and water discharge areas (natural and man-made). The discussion of impacts pertains to the potential to affect wetlands and jurisdictional waters of the U.S. due to construction or demolition activities under the proposed action.

For the purposes of this EIS wildlife includes all vertebrate animals (i.e., fish, amphibians, reptiles, birds, and mammals) with the exception of those identified as threatened, endangered, or sensitive species. Wild horses and burros are also included and protected by PL 92-195, the Wild Free-Roaming Horse and Burro Act of 1971, as amended. Wildlife potentially affected by demolition and construction activities and overflight noise will be discussed.

Special-Status Species. Special-status species are defined as those plant and animal species listed as threatened, endangered, or proposed as such by the USFWS. The federal Endangered Species Act (ESA) protects federally listed, threatened, and endangered plant and animal species. Species of concern are not protected by the ESA; however, these species could become listed and protected at any time. Their consideration early in the planning process could avoid future conflicts that might otherwise occur. The discussion of special-status species focuses on those species with the potential to be affected by demolition, construction, and construction-related noise. Appendix E lists the special-status species in the potentially affected areas.

The affected environment for biological resources includes those areas within each location potentially affected by ground-disturbing activities such as demolition, construction, or infrastructure development. All baseline data were gathered from previous studies such as the *Integrated Natural Resource Management Plan for Nellis Air Force Base* (Air Force 1999c) and *Renewal of the Nellis Air Force Range Land Withdrawal Legislative Environmental Impact Statement* (Air Force 1999b), and *Nevada Training Initiative Environmental Assessment* (Air Force 2003b).

3.10.1 Nellis AFB

Vegetation

Nellis AFB is located in the Mojave Desert. Large expanses of the valley floors in the Mojave Desert support the creosote bush (*Larrea tridentate*)/white bursage (*Ambrosia dumosa*) desert scrub community. The creosote bush and white bursage dominate plant communities at elevations from below sea level to about 3,940 ft (Air Force 1992b; Hazlett *et al.* 1997). This desert scrub community, characteristic of much of the Mojave Desert can still be found in the less developed areas of Nellis AFB, such as the eastern portion of Area II. Tamarisk or salt cedar (*Tamarix* spp.) is an introduced, non-native perennial plant species that has had a notable effect on plant associations. Tamarisk is known for releasing salt into surrounding soils which, in combination with the plant's aggressive growth and colonization, often results in establishment of monospecific and dense stands that often preclude establishment of native species. Nellis AFB has an aggressive program to eradicate Tamarisk from the installation. Traditionally, non-native drought-tolerant deciduous trees and shrubs, evergreen trees and shrubs, perennials, ground covers, vines, and grasses have also been planted throughout the base; however, over the past several years the focus has been on planting native vegetation. Introduced native and non-native vegetation are contained mostly within and adjacent to developed areas at the base (Air Force 1999c). Las Vegas bearpaw poppy (*Arctomecon californica*) and Las Vegas buckwheat (*Eriogonum corymbosum*), both plant species of concern, are present on gypsiferous soils in three different locations on Nellis AFB. These two plant species are discussed in detail in the special-status species section under Nellis AFB.

Wetlands and Jurisdictional Waters of the United States

Potential wetlands and jurisdictional waters of the U.S. on Nellis AFB consist of the golf course ponds and a few ephemeral streams. USACE personnel have determined that the golf course ponds are man-made water sources and not subject to wetlands and jurisdictional water protection under the provisions of the CWA because they are man-made and the water source is not natural (Air Force 1999c). Because the Las Vegas Wash is connected to the Colorado River, any ephemeral streams and washes eventually emptying into the Las Vegas Wash could be considered jurisdictional under Section 404 of the CWA. Any action that would result in the placement of fill in those streams would require consultation with the USACE (Air Force 1999c).

Wildlife

Due to its location adjacent to metropolitan Las Vegas and previous development and construction activities, Nellis AFB is primarily an urban environment with some relatively undisturbed lands lying to the east and north of the base. Wildlife species found on base are mostly limited to those that have adapted to high levels of human activity and disturbance. Three general habitat types are present on the base: urban areas, open space recreation (e.g., golf course), and native desert scrub vegetation. Common bird species in the urban areas include house finch and house sparrow. Open spaces are frequented by American coot (*Fulica americana*), horned lark (*Eremophila alpestris*), great-tailed grackle (*Quiscalus mexicanus*), and domestic geese and ducks. The areas with the most diverse wildlife are those containing native desertscrub vegetation. Area II (refer to Figure 2-1) comprises the most undisturbed native desertscrub habitat on the base. Coyote (*Canis latrans*), Gambel's quail (*Callipepla gambelii*), mourning dove (*Zenaida macroura*), desert spiny lizard (*Sceloporus magister*), and side-blotched lizard (*Uta stansburiana*) are common wildlife species found in the vicinity of the base (Air Force 1999c).

Special-Status Species

Only one federally-listed animal species, the desert tortoise (*Gopherus agassizii*), is present on the base in low densities in undeveloped portions of Area II. The desert tortoise is the largest reptile in the arid southwestern U.S. Tortoises spend much of their lives in underground burrows they excavate to escape the harsh summer and winter desert conditions. They usually emerge in late winter or early spring and again in the fall to feed and mate, although they may be active during summer when temperatures are moderate. Desert tortoises are herbivorous, eating a wide variety of herbaceous vegetation, especially flowers of annual plants. Historically the tortoise occupied a variety of desert communities in southeastern California, southern Nevada, western and southern Arizona, southwestern Utah, and through Sonora and northern Sinaloa, Mexico. Today it can still be found in these areas, although the populations are fragmented and declining over most of its former range (Air Force 1999c).

A recent USFWS programmatic biological opinion (USFWS 2007), regarding future impacts to the desert tortoise population in Areas I, II, III, and the Small Arms Range of Nellis AFB for a 5-year period, states that programmatic activities proposed by the Air Force "…is not likely to jeopardize the continued existence of the threatened Mojave population of the desert tortoise…" The USFWS issued reasonable and prudent measures, including implementing terms and conditions designed to minimize incidental take in Areas I, II, III, and the Small Arms Range. According to 50 CFR 402.16, any new Air Force action that may affect the desert tortoise, not considered in previous biological opinions, would require reinitiation of consultation with the USFWS. The 2007 opinion noted that Area I contains no desert tortoises or desert tortoise habitat.

Two plant and two animal species of concern have been observed or occur on Nellis AFB. These are the Las Vegas bearpoppy, Las Vegas buckwheat, chuckwalla (*Sauromalus obesus*), and western burrowing owl *(Athene cunicularia).* Four populations of Las Vegas bearpoppy have been located on Nellis AFB: three populations in Area II and one population in Area III. In 1996, Area II had approximately 1,300 plants and Area III had the largest population (Air Force 1999c). The poppy populations are found exclusively on gypsiferous soils. The Las Vegas buckwheat is another rare species observed and documented on Nellis AFB. Habitat of two animal species of concern, the banded Gila monster (*Heloderma suspectum cinctum*), and phainopepla (*Phainopepla nitens*) occurs on the base; however, neither of these species has been observed on Nellis AFB. Phainopepla, a passerine species, favors mesquite groves such as those found in the Desert Wells Annex area located 4 miles west of Nellis AFB.

The chuckwalla, a large lizard, has been confirmed due to presence of scat on the rocky hillsides of the eastern portion of Area II. The chuckwallas inhabit rocky hillsides, talus slopes, and rock outcrops in areas dominated by creosote. Rocks and their associated crevices provide shelter and basking sites. The western burrowing owl is a species native to southern Nevada that adapts well to urban environments. The owl prefers flat, previously disturbed areas like those found around the southern boundary of Nellis AFB, including edges of concrete flood control channels, for the excavation their burrows and are commonly found on the base. The banded Gila monster is one of the few venomous lizards in the world and has not been observed on Nellis AFB.

3.10.2 Nevada Test and Training Range

Vegetation

Due to differences in habitats, the North and South ranges support somewhat different biological resources. The North Range is a transitional area between the Mojave Desert and Great Basin that supports a mixture of community types, including creosote bush scrub, Joshua tree woodland, pinyon-juniper woodland, mixed desert scrub community, Great Basin sagebrush scrub, black sagebrush scrub, and a sparsely vegetated rock outcrop community (Air Force 1999c). Farther north, the North Range fully transitions to the Great Basin Desert, dominated by sagebrush and saltbush vegetation. The vegetation of the basin floors of the North Range is typified by shadscale (*A triplex confertifolia*) and greasewood (*Sarcobatus baileyi*) and may include winter fat (*Ceratoides lanata)* and green molly (*Poecilia sphenops*). Most of the middle- and upper-elevation bajadas are dominated by the sagebrush/pinyon/juniper community. Additional species that occur in this community include: rabbitbrush (*Chrysothamnus greenei ssp. Filifolius),* joint fir (*Ephedra* spp.*)*, and occasional Joshua trees (*Yucca brevifolia*). Scattered Utah juniper (*Juniperus osteosperma*) can occur on the flanks near the upper limit of sagebrush vegetation. The dominant vegetation type in the North Range mountains, above approximately 5,000 feet, is pinyon juniper woodland, with big sagebrush dominating the shrub layer.

White fir occurs at elevations above approximately 8,000 feet, with single leaf pinyon and limber pine (Air Force 1999c).

The South Range lies in the northeastern portion of the Mojave Desert. Creosote bush white bursage and saltbush communities are the most common vegetation communities on the South Range. Where soils are especially alkaline and clay-rich, as on the margins of dry lake beds (playas) at the lowest elevations, saltbush species including four-wing saltbush (*A. canescens*), cattle-spinach (*A. polycarpa*), and shadscale dominate the vegetation. Saltbush communities, especially near playas, may consist exclusively of these species. Vast areas of the basins and bajadas in the Mojave Desert, below approximately 4,000 feet, support plant communities dominated by creosote bush and whitebursage. Saltbush species, ephedras, brittlebush (*Enceliavirginensis*), desert mallow (*Sphaeralcea ambigua*), cacti (especially prickly pears and chollas [*Opuntia* spp.]), and Mojave yucca (*Yucca shidigera*) may also occur in this community (Air Force 1999c).

At higher elevations (approximately 4,000 to 6,000 feet) the blackbrush community may predominate. This community includes blackbrush (*Coleogyne ramosissima*), ephedras, turpentine-broom (*Thamnosma montana*), and range ratney (*Krameria parvifolia*). Joshua tree is another plant that may occur at higher elevations within the creosote bush white bursage and the blackbrush communities. The sagebrush pinyon juniper community comprises a woodland that is present on the South Range and is distinctive of the higher elevations of the Mojave and Great Basin Deserts above at least 4,900 feet elevation, and usually above 5,900 feet (Air Force 1999c).

Wetlands and Jurisdictional Waters of the United States

The Wetlands Report (Air Force 1997b) surveyed the NTTR and identified numerous seeps, springs, and ephemeral streams. It has not been determined if these waters are jurisdictional waters of the U.S. and they will need to be assessed in light of the Supreme Court's 2002 Stormwater Agency of Northern Cook County and the 2006 Rapanos v. U.S. and Carabell v. U.S. known as Rapanos decisions. Mapping of wetlands and jurisdictional waters of the U.S. in the NTTR remains incomplete.

Wildlife

Wildlife in the vicinity of the North Range includes species that are primarily associated with Great Basin montane scrub, pinyon juniper woodland, Great Basin desert scrub, desert springs, and open water habitats. These habitats support numerous wildlife species including several species considered sensitive by state and federal governments. Most of the North Range comprises Great Basin habitats, the exceptions being in the southwestern corner, which is part of the transition between Mojave and Great Basin deserts. As a result, many (but not all) wildlife species associated with both Mojave and Great Basin habitats occur in this area.

Wildlife species associated with Mojave Desert transitional habitats found in the North Range are similar to those found in the South Range. Most of the common, larger mammal species that occur in the North Range habitats are similarly found in the South Range. A population of bighorn sheep (*Ovis Canadensis*) inhabits on Stonewall Mountain, Cactus Range, and Pahute Mesa are found in the North range. In the South Range, Bighorn Sheep inhabit the Spotted, Pintwater, Sheep, and Desert Ranges. In addition, the rougher, more densely vegetated regions in the higher elevations of the North Range also support mountain lion (*Puma concolor*), bobcat (*Felis rufus*), and mule deer (*Odocoileus Hemionus*). Pronghorn antelope (*Antilocapra americana*) and wild horses predominantly occupy the desert scrub communities found in the North Range, particularly in Cactus Flat, on alluvial fans bordering Breen Creek, and in the Kawich Valley.

The rodents of the Great Basin desert scrub habitat differ from those of the southern Mojave desert and include the pallid kangaroo mouse (*Microdipodops pallidus*), dark kangaroo mouse (*M. megacephalus*), sagebrush vole (*Lagarus curtatus*), and chisel-toothed kangaroo rat (*Dipodomys microps*). Several bat species are documented on the range in a NTTR-commissioned bat survey report (Air Force 1999b). Six species of bats, of the 20 species potentially occurring in the area, were documented on NTTR including long-legged myotis (*M. volans*), fringe-tailed myotis (*M. thysanodes pahasapensis*), California myotis (*Myotis californicus*), pipistrelle (*Pipistrellus hesperus*), Townsend's big-eared bat (*Plecotus townsendii*), and pallid bat (*Antrozous pallidus*). The California myotis was the most widespread and commonly observed species in the report and was found in all habitats that were sampled.

Bird species typical of the sagebrush community include the sage thrasher (*Oreoscoptes montanus*), sage sparrow (*Amphispiza belli*), and horned lark (*Eremophila alpestris*). Chukars (*Alectoris chukar*) have been introduced into the area and survive in rocky habitat and desert scrub near freshwater habitat. Raptors, regularly observed in the area, are similar to those found in the Mojave desert scrub in the South Range. The pinyon juniper woodland supports the greatest bird diversities in the region. Reptiles are less abundant in the North Range, which is colder than the Mojave Desert Scrub habitat in the South Range. Some reptile species found in the North Range are also observed in the South Range (e.g., side-blotched and whiptail lizards). Additional species include sagebrush lizard (*Scloperous graciosus*), leopard lizard (*Gambelia wislizenii*), and the Great Basin rattlesnake (*Crotalus viridis lutosis*). Desert tortoise is not found in the North Range. Amphibians on the North Range are restricted to the rare areas near water and include the Great Basin spadefoot toad (*Scaphiopus hammondi*). Native fishes are not known or expected to occur because of the lack of perennial pools of water, of sufficient extent, to sustain populations during drought.

Wildlife species associated with Mojave desert habitats found in the South Range are similar to those described above in the North Range section. Most of the common, larger mammal species that occur in the North Range habitats are similarly found in the South Range.

Special-Status Species

There are 38 state- or federally-listed plant and animal species of concern occurring or potentially occurring within the affected environment of NTTR (USFWS 2004). There are no federally-listed threatened or endangered *plant* species known or likely to occur within NTTR's North and South Ranges. The only known federally-listed *wildlife* species known to occur on NTTR is the desert tortoise which is only found in the southern portion of the South Range.

The Mojave desert population of the desert tortoise, whose general distribution includes portions of NTTR, was listed as threatened by the USFWS on April 2, 1990. The USFWS attributes the decline of this species to disease, predation from increased raven populations, collecting, vehicle mortalities, and habitat degradation, destruction, and fragmentation. The species' range in this region lies primarily within the Mojave desert scrub habitat at elevations below 4,000 feet. Desert tortoise home ranges vary with location and year, but may cover from 25 to 200 acres. Basic habitat requirements include the quality of forage species, shelter from predators and environmental extremes, suitable soil types for burrowing, nesting and over-wintering, vegetation for cover and shelter, and adequate area for movement and dispersal. These requirements may be met in a variety of plant communities including Joshua tree, Mojave yucca, creosote bush, and saltbush scrub. Tortoises are herbivorous, with the most important food apparently being desert annuals, cacti, and grasses. Desert tortoise mating starts with spring emergence and may continue until fall dormancy. Nesting occurs from May to July. Females dig nests, deposit eggs, and abandon the nest; incubation varies from 90 to 120 days (Revegetation Innovations 1992).

Desert tortoise habitat and burrows are most commonly found within creosote bush scrub communities on flat areas or gently sloping areas, washes, bajadas within valley floors. However, they may also be found in steeper, rockier areas. Soil structure is an important limiting factor for tortoise habitat. Soils must be firm enough to hold burrows, but soft enough to allow digging. A variety of soil types, from sandy to sandy-gravely, may be used.

For NTTR, desert tortoise habitat occurs in the areas of the South Range consisting of Mojave desert scrub. This area within the South Range represents a small percentage of the available desert tortoise habitat within the Northeastern Mojave Recovery Unit. The South Range lies within the extreme northern limits of desert tortoise geographical extent. The NTTR falls within the Coyote Spring Desert Wildlife Management Area (DWMA), which has been designated as part of the recovery units based on the Desert Tortoise (Mojave Population) Recovery Plan. However, NTTR is not part of the designated critical habitat areas. Designated recovery units contain both "suitable" and "unsuitable" habitat. Some areas within NTTR, such as the ordnance impact zones, are located in areas that are considered "unsuitable" or are highly disturbed and do not contain nesting, sheltering, or foraging habitat (USFWS 1994).

Several desert tortoise surveys that have been conducted on NTTR South Range. These surveys (Figure 3.10-1) have shown that the southern half of the South Range clearly lies near the northern limits of the desert tortoise range. In this area, population densities are generally lower and populations tend to be "patchy." Surveys of the South Range have shown a range of density from 1 to 45 desert tortoise per square mile population density (USFWS 1994). The following details the methods and results of these surveys.

The most extensive survey was completed during 1992 (Revegetation Innovations 1992) covering approximately 459 square miles and including all areas below 3,600 feet in the Indian Springs Valley, and below 4,000 feet in the Three Lakes Valley, the eastern fringes of Frenchman Valley, and the Nellis Small Arms Range adjacent to Nellis AFB in the Las Vegas Valley. All existing impact areas were surveyed using three 0.5 mile-long transects, 30 feet wide, within each topographic map section. Surveyors recorded any evidence of tortoise or tortoise activity (tracks, eggshells, burrows, carcasses, and scat). This survey found desert tortoise population densities to be very low (0 tortoise per square mile) to low (1 to 3 tortoise per square mile), relative to other parts of the tortoise's range (USFWS 1997). Only 110 of 431, or 25 percent of the transects showed any sign of (burrows, carcasses, scat) or actual presence of the desert tortoise.

In 1990, three surveys, covering 890 acres within South Range were preformed: 1) a 100-percent survey of 560 acres along the southwestern edge of Dog Bone Lake located 5 desert tortoises, 25 active burrows, 3 carcasses, and 26 inactive burrows; 2) another survey of 260 acres did not locate any sign of or actual presence of tortoise; and 3) seven 10-acre sites in Indian Springs and Three Lake Valleys, found no desert tortoise or desert tortoise signs.

A 1993 survey of approximately 70 acres east of Dog Bone Lake, within an impact zone located 2 desert tortoises, 13 active burrows, 6 carcasses, 6 scat, and 24 inactive burrows. This survey used transects similar to those in the 1992 survey of four 40-acre plots. Sixteen additional 10-acre surveys were conducted at sites located within Indian Springs and Three Lakes Valleys. No desert tortoise or sign of tortoise was located at any of these sites.

In 2001, a 100-percent coverage survey was completed for a 7.5-mile corridor proposed for road construction. Three corridor segments were surveyed: two segments totaling approximately 6 miles extended along the west side of Dog Bone Lake within an impact zone. The remaining section was located in the northern portion of the Indian Springs Valley. This survey did not locate any desert tortoise or active burrows and noted evidence of previous disturbance from training activities. Five inactive tortoise burrows were located (Air Force 2003b).

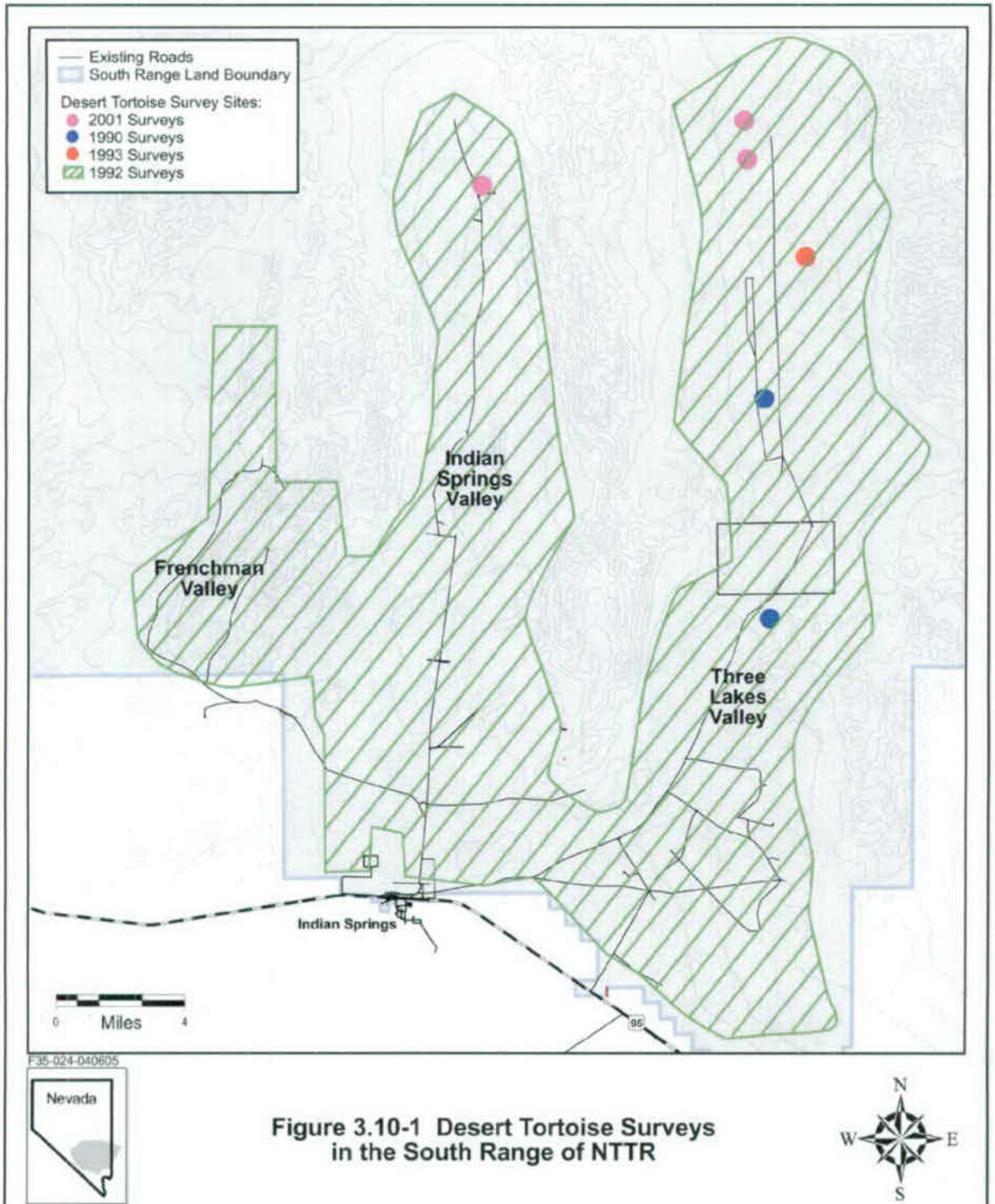


Figure 3.10-1 Desert Tortoise Surveys in the South Range of NTTR

The most recent survey conducted in June 2002, consisted of a 100-percent presence/absence survey in portions of the South Range. Three live tortoises were observed in burrows, along with fresh tracks of a fourth tortoise. A total of 41 burrows, 14 potential burrows, 13 pallets, 14 scats, 2 carcasses, and 2 sets of desert tortoise tracks were also observed during the June 2002 survey. The survey did not locate any desert tortoise or active burrows in the areas examined in Range 64 (USFWS 2003).

The USFWS programmatic BO, issued on June 17, 2003 (amending the earlier Biological Opinion issued February 5, 1997), concluded that training activities at NTTR would not jeopardize the continued existence of the desert tortoise or destroy or adversely modify critical habitat (USFWS 2003). The Opinion also indicated measures to be taken to minimize desert tortoise mortality or harassment and destruction of habitat which include the following: a maximum speed limit of 25 miles per hour for all regular vehicle travel; no off-road travel with the exception of Explosive Ordnance Disposal (EOD); removal of desert tortoise from areas of impact by a qualified biologist; development of an approved vegetation rehabilitation plan; and a tortoise education program to be given to employees working in tortoise habitat.

Additional state and federal species of concern may occur on NTTR (see Appendix E). This status category does not confer any specific legal protection, but the Nellis AFB 99 Civil Engineering Squadron, Environmental Management Flight gives consideration to species of concern in ongoing management of NTTR and as part of NEPA compliance. Species of concern and BLM-sensitive species that are known or likely to occur on NTTR include seven species of mammals (six of which are bats), eight species of birds, and two species of reptiles. The majority of these avian species are expected to occur on NTTR only seasonally in small numbers. The phainopepla is the only common year-round resident, and burrowing owl and ferruginous hawk may breed on NTTR in small numbers.

No formal surveys for pygmy rabbits have been conducted on the NTTR. During cursory investigations of certain seeps and springs, pygmy rabbit droppings and burrows were observed in sagebrush habitats located on the east side of the Kawich Mountain Range. The extent of pygmy rabbit distribution and population density on the NTTR remains unknown at this time (personal communication, Turner 2006). A bat survey report (Air Force 1999b) documented the presence of three sensitive species of bats on NTTR, Townsend's big-eared bat, fringed myotis, and long-legged myotis. Other bat species such as the western small-footed myotis, spotted bat, and the long-eared myotis have been observed on the DOE's NTS and are likely to occur on NTTR.

3.11 CULTURAL RESOURCES

Cultural resources are sites, buildings, structures, or objects that are over 50 years old. Locations with significant importance to a group are traditional properties. Resources and locations are recorded and evaluated by archaeologists and historians. Those that meet one or more criteria in 36 CFR 60.4 are determined by the Air Force as eligible for nomination to the *National Register of Historic Places*. An Area of Potential Effect includes eligible properties that could be affected by the action even if not within the region of influence (or affected environment), such as a shelter cave that is visible to construction personnel who have the potential to visit and remove artifacts. If the federal action has potential for adverse effects to eligible sites, the Air Force makes a determination of adverse effect; if no eligible properties are present, the determination is either no historic properties present or no adverse affects. The Area of Potential Effect for this action is defined as the region of influence, or affected environment.

Section 106 of the *National Historic Preservation Act of 1966* (NHPA) requires that federal agencies take into account the effects of their undertakings on historic properties which are locations, features, and objects older than 50 years and determined eligible for nomination to the *National Register of Historic Places* (or National Register). Methods for inventory and evaluation are described in Appendix I of the 2007 Integrated Cultural Resources Management Plan (Air Force 2007b). Efforts to identify and evaluate cultural resource properties for this project, according to 36 CFR 800.4, were initiated in 1978 and continue to the present. Nellis AFB initiated a Native American Program in 1996 as a foundation for government-to-government consultation. Activities have included annual meetings, NTTR field trips, participation in professional meetings, and the formation in 1999 of a Document Review Committee which reads and comments on cultural resources reports and environmental assessments prior to SHPO reviews.

The affected environment is Nellis AFB-managed land in Nevada that includes the NTTR and Nellis AFB's property in Las Vegas Valley. Section 112 of the NHPA mandates that federal agencies maintain permanent records produced through historical and archaeological research in appropriate databases, access to which shall be granted to potential users who meet the qualifications established by the Secretary of the Interior. The cultural resources inventory, identification, and evaluation process on Nellis AFB lands developed from minimal recordation without evaluation into a system that emphasizes a substantially higher demand for thoroughness. For example, an estimated 60 percent of site forms composed prior to 1994 lack justifications using research questions and National Register criteria to recommend eligibility. Forty percent of the records prior to 1982 lack sufficient information to meet current Nellis AFB standards.

Archival searches yielded information on the dates, characteristics, intensity of cultural resource surveys, locations of cultural resources, and assessed effects upon sites. *Federal Register* volumes were reviewed to verify eligible or listed National Register properties. Records for inventories on Nellis AFB and NTTR are maintained in an Excel program in the 99 Environmental Management Division files. Results of surveys on the DNWR's co-managed portion of the South Range are also on file at Nellis AFB.

All inventory acreage was inspected at a maximum of 100-foot transect intervals. Sampling utilized 100-foot intervals in blocks. Isolate artifacts were recorded on site forms until 1996. They were not considered sites in the ICRMP, thus not included in the total calculations in this document. Most inventory acreage has been obtained from sampling strategies in zones, not projected for impacts, to characterize the sensitivity of the land. Thus, inventoried acreage totals do not imply the surveys were subjected to complete site evaluation or consultation on determinations.

3.11.1 Nellis AFB

All of Nellis AFB, which includes Area I, Area II, and Area III, has been surveyed for archaeological resources and all sites evaluated. One National Register-eligible site, a quarry, is located on the base. All other sites were determined through SHPO consultation (letter dated April 12, 2001) to be ineligible for nomination. The Nevada SHPO has concurred with these determinations (Nevada SHPO 2004).

The areas north and east of Nellis AFB are currently open range, somewhat mountainous, and managed by the BLM. Areas to the south and west are developed. The undeveloped areas are considered to be low in potential for containing prehistoric resources since they lack water, are covered in sand dunes, and would have possessed few food resources in the past. Approximately 10 percent of this area, which is managed by the BLM, has been surveyed. A total of 20 prehistoric sites and 9 historic sites have been recorded (Air Force 2007b).

In 1988, an inventory and evaluation of World War II structures was completed for Area I of Nellis AFB. In a letter dated 14 June 1991, the Nevada SHPO reviewed the evaluation and concurred that no eligible structures were present, the office requested further review of the McCarran Field Air Terminal built in 1942. An informal review of the building was conducted in 1997 by a SHPO architectural historian. The SHPO historian determined the alterations to the building had compromised its physical integrity. Thus, no World War II structures on Nellis AFB are considered to be eligible to the National Register (Air Force 2001b).

In 2004, 336 Wherry houses constructed from 1950 to 1957 and 113 Capehart structures built on Nellis AFB in 1960 were proposed for destruction. Field research was conducted and it was argued that the buildings lacked physical integrity for further eligibility consideration. The SHPO concurred with the recommendation (personal communication, Myhrer 2006). Following this review, Nellis AFB determined an updated historic building inventory for the Nellis AFB Las Vegas Valley properties and Creech AFB was necessary.

According to 36 CFR 60.4 (g), special properties may have achieved significance within the last 50 years due to exceptional importance within the appropriate local, state, or national historic context. Because the Cold War had impacts for the history of the nation, the DoD Legacy Resource Management Program and the Air Force Federal Preservation Officer determined it necessary to evaluate Cold War facilities to comply with Section 110. To ensure compliance with Section 106, an action memo was sent in 1992 to the Air Force Civil Engineer stating that the SHPO would be consulted prior to any actions with potential to affect Cold War facilities.

Nine structures, constructed between 1951 and 1971, were inventoried in 2006 (Air Force 2006c). These structures were identified in an on-going survey and evaluation of 172 buildings from the Cold War era on Nellis AFB. Due to their proposed demolition (as part of the Base Realignment and Infrastructure actions occurring on the base); however, a separate report on eligibility recommendations for Nevada SHPO Section 106 review was done by Nellis AFB. These nine structures include seven buildings that are older than 50 years (Buildings 67, 250, 258, 265, 839, 841, and 941) and two that are less than 50 years old (Buildings 264 and 413). Consultation with SHPO on the ineligibility of the nine structures was completed in December 2006. The Nevada SHPO concurred that the nine structures were not eligible to the NRHP (Appendix A provides a copy of this concurrence letter).

The ongoing consultation in the Native American Program addresses traditional resources and in 2005, the first pine nut harvest in 65 years was conducted on NTTR as part of the evaluation process. No traditional resources, sacred areas, or traditional use areas have been identified on Nellis AFB.

3.11.2 Nevada Test and Training Range

Archaeological Resources

Approximately 5,000 archaeological resources have been recorded under the NTTR airspace. These consist of an estimated 600 within Clark County, 2,400 within Lincoln County, and 2,000 within Nye County. Within Clark County, only one of these archaeological sites is listed on the National Register. In Lincoln County, two archaeological districts and six archaeological sites are listed on the National Register. In Nye County, one National Register-listed site lies under the airspace (Air Force 1999b). Most of the recorded archaeological sites have not been evaluated for National Register eligibility.

Historic archaeological sites associated with mining and ranching are found throughout NTTR. Seventy-six historic resources have been identified and recorded including ranching complexes and mining towns (U.S. Air Force, U.S. Navy, Department of the Interior 1991; Air Force 2007b). As mining and ranching were practiced throughout NTTR, it is reasonable to expect that similar historic sites would be found elsewhere. Other historic resources on NTTR include transportation and communications routes. A segment of the Las Vegas-Tonopah Railroad, built and used from 1907 to 1916, crosses the southern boundary of Creech AFB.

Approximately 6 percent of the withdrawn areas within NTTR have been surveyed for archaeological resources. The Tonopah Test Range, Creech AFB, and the Tolicha Peak compounds were completely inventoried with no eligible sites found (Air Force 2007b). Over 2,500 sites have been recorded within the withdrawn area of NTTR. Thirty-four sites are considered to be eligible for the National Register and 2,522 sites are unevaluated. Based on current evaluation standards, many unevaluated sites, especially those on playas and at lower elevations (below 5,000 feet), probably would not be recommended eligible to the National Register (Myhrer 2003). A total of 211 have been evaluated and are considered to be not eligible to the National Register.

Architectural Resources

Hundreds of structures, features, and a few towns associated with the mining and ranching history of Nevada are found throughout NTTR. Numerous mines and 15 mining districts, many with associated campsites, were opened in what is now the withdrawn area of NTTR during the late 19th and early 20th centuries. More than 100 historic ghost towns, most containing architectural features, are located under the MOAs and restricted air space. Townsites include Hiko, Delamar, Helene, Barclay, Tempiute, Crystal Springs, Pioche, Bullionville, and Reveille (United States Ghost Towns 2006). The towns were associated with mining and railroad operations in the area. Some are still inhabited while others are abandoned and in various states of decay. No World War II and Cold War-era National Register structures have been identified within NTTR or under associated airspace.

Traditional Cultural Resources

Traditional American Indian resources located on NTTR include traditionally used plants and animals, trails, and certain geographic areas. Types of resources that have been specifically identified in recent studies include rock art sites; power rocks and locations; medicine areas; landscape features such as specific peaks or ranges, hot springs, meadows, valleys, and caves; traditional-use plants (AIWS 1997); traditional-use animals such as hawks, eagles, insects, mountain lions, and deer; burial sites; gathering places for rabbit drives, dances, and ceremonies; traditional landscapes; and lithic raw material. Through Nellis AFB's Native American Program and ethnographic studies, ceremonial and sacred sites within NTTR have been identified and protected. Consultation through the Native American Program early in the planning process ensures that traditional cultural properties would not be affected by proposed projects. No specific traditional resource issues with regard to the F-35 beddown arose during scoping.

3.12 HAZARDOUS MATERIALS AND WASTE

Hazardous materials (HAZMAT), listed under the Comprehensive Environmental Response, Compensations, and Liability Act (CERCLA), and the Emergency Planning and Community Right-to-Know Act, are defined as any substance that, due to quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to public health, welfare, or the environment. Examples of HAZMAT include petroleum products, synthetic gas, and toxic chemicals. Hazardous wastes, listed under the Resource Conservation and Recovery Act (RCRA), are defined as any solid, liquid, contained gaseous, or semisolid waste, or any combination of wastes, that pose a substantial present or potential hazard to human health or the environment. Additionally, hazardous wastes must either meet a hazardous characteristic of ignitability, corrosivity, or reactivity under 40 CFR Part 261, or be listed as a waste under 40 CFR Part 263.

Hazardous materials and wastes are federally regulated by the EPA, in accordance with the Federal Water Pollution Control Act; CWA; Toxic Substance Control Act; RCRA; CERCLA; and CAA. The federal government is required to comply with these acts and all applicable state regulations under Executive Order (EO) 12088 and DoD Directive 4150.7, AFI 32-1053. Additionally, EO 12088, under the authority of the EPA, ensures that necessary actions are taken for the prevention, management, and abatement of environmental pollution from HAZMAT or hazardous waste due to federal activities.

Asbestos-containing material (ACM) is any material containing more than 1 percent by weight of asbestos and can be crumbled, pulverized, or reduced to powder, when dry, by hand pressure. Asbestos is made up of microscopic bundles of fibers that may be airborne when distributed or damaged. Due to its ability to withstand heat, fire, and chemicals, asbestos was historically used in construction materials, and is typically found in ceiling tiles, pipe and vessel insulation, floor tile, linoleum, mastic, and on structural beams and ceilings. Laws which address the health risks of exposure to asbestos and ACMs include Toxic Substance Control Act, Occupational Safety and Health Act (OSHA) regulations (29 CFR), and CAA (Section 112 of the CAA, as amended, 42 USC § 7401 *et seq.*). EPA regulations concerning asbestos are contained in 40 CFR 61. The regulations require that the EPA or authorized state agencies be notified of asbestos removal projects.

Lead-based paint (LBP) was commonly used from the 1940s until the 1970s for exterior and interior painted surfaces. In 1978, the U.S. Consumer Product Safety Commission lowered the legal maximum lead content in most kinds of paint to trace amounts, therefore, buildings constructed after 1978 are presumed not to contain LBP. The use and management of LBP is regulated under Section 1017 of the Residential Lead-Based Paint Hazard Reduction Act of 1992. Section 1017 requires the implementation of federally-supported work involving risk assessments, inspection, interim controls, and abatement of lead-based paint hazards. Regulations relating to LBP can be found at 29 CFR, 40 CFR, and 49 CFR.

Other topics commonly addressed under HAZMAT and wastes include underground storage tanks (UST), potential contaminated sites designated under the Air Force's Environmental Restoration Program, polychlorinated biphenyls (PCBs), and radon. For each of these issues, Nellis AFB has implemented and/or completed investigative removal and clean-up programs under appropriate federal regulations. Review of baseline conditions relative to the elements of the proposed action established that no proposed construction or other on-base activity would affect or be affected by transformers or other materials containing PCBs, and structures associated with radon levels above EPA action levels. Therefore, this EIS does not address these topics further.

There are currently nine active Environmental Restoration Program (ERP) sites on Nellis AFB (Air Force 2004d). Four of these sites (SS-28, ST-44, SS-45, and SS-46) could be impacted by the proposed action construction (Figure 3.12-1). Site SS-28 is an historic fuel spill located near Building 941 and remedial action operations are underway for extraction of product/ground water and long-term monitoring to ensure CERCLA compliance. ST-44 is a fuel leak from two USTs at the AGE service island. Remedial action operations have continued with the injection of potassium permanganate to further degrade onsite contamination. Site SS-45 is a fuel spill near the Base Exchange Car Care Center. Remedial action operations have continued with the injection of hydrogen peroxide to further degrade the contamination. Site SS-46 is a trichloroethylene (TCE) spill with remediation continuing with the injection of potassium permanganate to further degrade contamination onsite.

An ERP waiver would be required if proposed construction should occur above ERP groundwater plumes. If proposed construction should occur on an ERP site, the remediation would need to be completed prior to initiation of the project.

Although not an ERP site, an active but remediated JP-8 jet fuel spill site lies near the east side of the fighter revetments (see Figure 3.12-1). The release of JP-8 into the soil and groundwater occurred from leaking underground fuel supply pipes in 1995 and 1997; all leaks were repaired. Remediation involves groundwater monitoring and continued operation of the soil vapor extraction system to mitigate the residual hydrocarbons in the affected soil. Estimated closure date for the site is expected to be late 2007.

The affected areas for potential impacts related to HAZMAT and waste consists of Nellis AFB, with an emphasis on aircraft maintenance and munitions handling areas. Since the proposed F-35 FDE program and WS aircraft operations within NTTR would not generate or require disposal of hazardous wastes, a discussion of hazardous wastes within NTTR and under associated airspace is not provided.

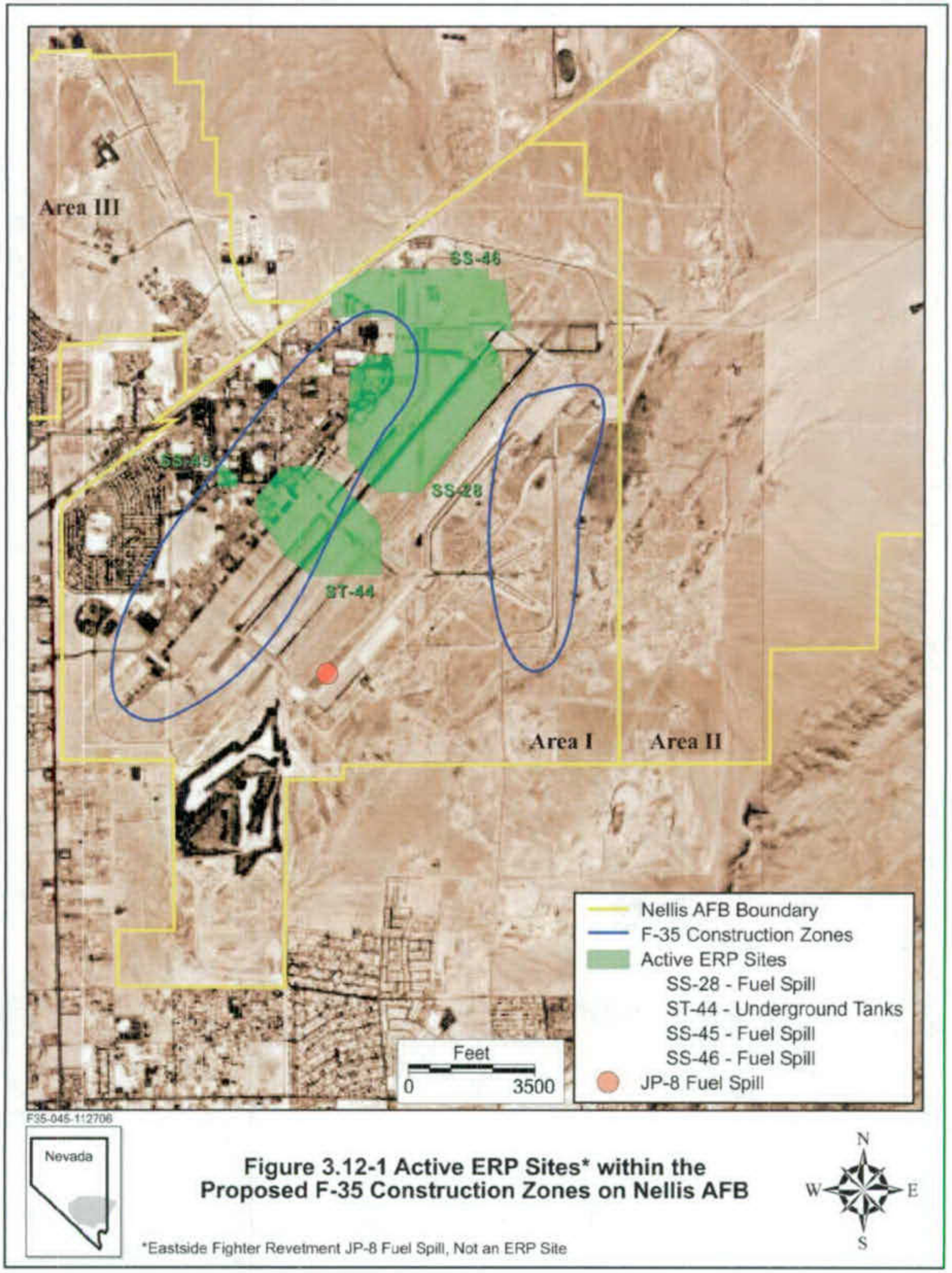


Figure 3.12-1 Active ERP Sites* within the Proposed F-35 Construction Zones on Nellis AFB

*Eastside Fighter Revetment JP-8 Fuel Spill, Not an ERP Site

3.12.1 Hazardous Materials and Hazardous Waste Generation

Activities at Nellis AFB require the use and storage of a variety of hazardous materials that include flammable and combustible liquids, acids, corrosives, caustics, anti-icing chemicals, compressed gases, solvents, paints, paint thinners, and pesticides.

Nellis AFB uses a hazardous material pharmacy pollution prevention system to manage hazardous materials. This process provides centralized management of the procurement, handling, storage, and issuing of hazardous materials, as well as the turn-in, recovery, reuse, recycling, and disposal of hazardous wastes. The pharmacy approval process also includes review and approval by Air Force personnel. In addition, the base has a Facilities Response Plan, (Air Force 2002b), which includes site specific contingency plans.

The Nellis AFB Hazardous Waste Management Plan (Air Force 2002c) provides guidance and procedures for proper management of RCRA and non-RCRA hazardous waste generated on the base to ensure compliance with applicable regulations. Base management plans and DoD directives also serve to implement these laws and regulations and include hazardous material management plans, spill prevention and contingency plans, and pollution prevention plans that are regularly updated to reflect any changes in the base mission.

Nellis AFB generated approximately 191,000 pounds of RCRA hazardous waste in 2004 (personal communication, Wingate 2005), and is therefore considered a large quantity generator by the EPA. Hazardous waste at Nellis AFB is accumulated at an approved 90-day storage area, or at satellite accumulation points. Approximately 100 satellite accumulation points and one 90-day storage area are operated at Nellis AFB (Air Force 2002c). All accumulation points must comply with requirements for siting, physical construction, operation, marking, labeling, and each inspection and must maintain a container inspection log. Generators of hazardous wastes are responsible for properly segregating, storing, characterizing, labeling, marking, and packaging all hazardous waste for disposal as prescribed by the Hazardous Materials Table in 49 CFR Part 172.101.

A variety of activities on base, including aircraft maintenance and support, civil engineering, and printing operations, have been identified as primary contributors to hazardous waste streams. Numerous other shops add to hazardous waste streams, including AGE, aircraft structural maintenance, fuels management, non-destructive inspection, munitions and armament shops, in-squadron maintenance, the wheel and tire shop, and others (e.g., avionics, egress systems, electrical, metals, pneudraulics, hydraulics, radio, jet engine, and structural maintenance). The greatest volumes of hazardous waste are generated from aircraft support functions. Routine activities conducted on the flightline generate paints containing lead-mercury-chromium, hazardous waste containers, and contaminated rags. Wastes derived from maintenance activities include petroleum, oils, and lubricants, paints and paint-related wastes such as thinners and strippers, batteries, contaminated spill absorbent, adhesives, sealers, solvents, fuel filters, photochemicals, ignitable wastes, and metals. Basic processes and waste handling procedures for general aircraft maintenance activities are identified in the Nellis AFB Hazardous Waste Management Plan (Air Force 2002c).

Nellis AFB has a proactive program to identify asbestos and lead in all structures in order to reduce potential hazards to occupant, workers, and the environment during future construction projects. Many buildings on base date from the 1940s through the 1980s; asbestos-containing materials have been identified in many of these facilities. Renovation or demolition of on-base structures is reviewed by Civil Engineering personnel to ensure appropriate measures are taken to reduce potential exposure to, and release of, friable asbestos. Non-friable asbestos is not considered a hazardous material until it is removed or disturbed. The Nellis AFB Asbestos Management and Operations Plan (Air Force 2003a) and Nellis AFB Lead-Based Paint Management Plan (Air Force 2003c) provides guidance on the proper handling and disposal of ACM and LBP.

4.0 ENVIRONMENTAL CONSEQUENCES

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

Chapter 4 presents the environmental consequences of the proposed beddown of the F-35 FDE program and WS at Nellis AFB. It addresses impacts for each of the 11 analyzed in Chapter 3. To identify the potential environmental consequences, this section (Chapter 4) overlays the components of the proposed action (Chapter 2) onto the affected environment (Chapter 3). A comprehensive matrix comparing the proposed action and the no-action alternative by resource and the potential impacts is provided in Table 2-17. Cumulative effects of the F-35 beddown with other past, present, and foreseeable future actions are presented in Chapter 5.

The F-35 proposal (construction and beddown) would occur over a 13-year period (2009 through 2022) with F-35 aircraft operations continuing beyond that time. To prepare for the aircraft beddown, construction would span from 2009 through 2014. During this time, construction as well as a total of 12 F-35 aircraft would arrive at Nellis AFB to conduct operations at the base and NTTR. Between 2014 and 2022, the Air Force would complete the beddown of F-35 aircraft; thus, 2022 would represent the peak year in which all 36 aircraft are at Nellis AFB and represent the maximum airfield operations at the base and sortie-operations within NTTR.

The Air Force performed the impact analysis according to the nature of the proposed activity (construction, demolition, and/or aircraft operations) and the potential impact these activities would have upon the resource. Between the years 2009 through 2014, where both construction and aircraft operations would coincide, resources where impacts would occur were evaluated. By 2015, when construction is completed, only aircraft operations would be associated with the proposed beddown completed in 2022. This date (2022) was chosen because it represents the peak year in which all 36 aircraft would be based at Nellis AFB and would be the most conservative (i.e., the greatest) number of aircraft operations (any previous year would experience fewer impacts than the full beddown of 36 aircraft) that would occur at the base and NTTR airspace. Table 4.1-1 presents this analysis approach as it relates to the type of impact, the year(s) associated with the impact, and the resource category.

Table 4.1-1 Impact Analysis Approach by Resource for Nellis AFB		
Resource Category	***Construction and Aircraft Operations (2009-2014)***	***Aircraft Operations (2022)***
Airspace Management and Aircraft Operations		✓
Noise	✓	✓
Air Quality	✓	✓
Safety		✓
Land Use and Recreation		✓
Socioeconomics and Infrastructure	✓	✓
Environmental Justice and Protection of Children	✓	✓
Soils and Water	✓	
Biological Resources	✓	✓
Cultural Resources	✓	✓
Hazardous Materials and Wastes	✓	✓

4.2 AIRSPACE AND AIRCRAFT OPERATIONS

The assessment of airspace use and management discusses how the proposed action and no-action alternatives would affect air traffic within the airspace of Nellis AFB and NTTR. Since no modifications or additions are proposed for the current airspace structure in support of this proposed action, the impact analysis focuses on changes in airspace use that would result from the addition of nearly 17,000 annual F-35 airfield operations by the year 2022. These sorties would increase current levels by about 21 percent without consideration of potential future budget constraints, changes in the number of exercises/exercise participants, fuel costs, and other factors that affect yearly cumulative sortie totals. Historic records indicate that total annual NTTR use has ranged between 200,000 and 300,000 sortie-operations (where a sortie-operation is counted for each NTTR subdivision through which an aircraft operates during the course of a mission sortie). Refer to Appendix B for more detailed information on historic NTTR sortie use.

While the F-35s will eventually replace the A-10, the current model more closely aligns with the F-16 and can be expected to operate within the same NTTR airspace subdivisions and perform the same type of combat missions. The F-35 will emphasize air-to-ground combat missions, but it would predominantly fulfill an air-to-air combat role. The majority of F-35 flight operations would occur during the day at subsonic speeds and altitudes at or above 5,000 feet AGL. Historic range utilization records indicate that about 65 percent of the F-16 annual mission sorties are conducted within restricted areas over air-to-ground targets. The other 35 percent occur in the MOAs where air-to-air training is emphasized. The F-35 would generally follow this pattern. The average duration of an F-35 mission would be about 1.5 hours.

4.2.1 Proposed Action

Nellis AFB

The proposed F-35 beddown would not adversely affect the use and management of the Class B airspace surrounding Nellis AFB. This is particularly evident when comparing operational increases that could result from the proposed action with historic operational levels. The proposed F-35 annual airfield operations are projected to be approximately 17,000. In 2022, with all 36 F-35 aircraft at the base, the added activity would raise total airfield operations by 20 percent. When taken in the context of the large historic fluctuations over the years, the overall impact on operations would be minor. This increase does not consider reductions or fluctuations that may occur over the years as a result of budget impacts, aircraft realignments, and changes in the number, composition, and duration of the different exercises. The proposed beddown would not require any modification to the current terminal airspace structure or operational procedures.

The F-35 would not require any changes to the departure and arrival route structures discussed in section 3.2.1. These routes were established on the basis of terrain and obstacle clearance, civil air traffic routes and available airspace, navigational aid coverage, noise abatement, and operational characteristics of aircraft based at Nellis AFB. There would be no impacts to Nellis AFB airfield and airspace structure.

Nevada Test and Training Range

Proposed F-35 activities would not alter the current structure or management of NTTR restricted areas and MOAs. While varying range operations through the years have resulted in cumulative total annual use ranging between 200,000 and 300,000 sortie-operations, the addition of F-35 aircraft would increase total sortie-operations by 51,840 annually. This represents a 26 percent increase under the low-use scenario and a 17 percent increase of the former maximum (300,000). Neither of these increases of sortie-operations (251,840 to 351,840) would tax the capability of NTTR to support this uptake for management or use. The F-35 would fly mission profiles similar to those flown by F-16s. Most F-35 training activities would occur throughout the restricted areas for air-to-ground training and the Desert and Reveille MOAs would continue to be used for air-to-air combat training and staging for range battlefield operations.

The F-35 would not require any changes to the airspace currently approved for supersonic operations. Current forecasts estimate the F-35 would fly supersonic approximately 3.5 percent of the time, increasing overall NTTR supersonic activity by less than 1 percent. It is anticipated that the F-35 would not fly supersonic as often as the F-16 because of the increased close-air support mission.

Under the proposed action, the F-35 would use MTRs IR-286 and VR-222 on a limited basis and their use by all aircraft would continue at a rate of less than one per day. The F-35's infrequent use would not impact use of MTRs by other aircraft, nor would it impact civil or commercial air traffic that pass through the regional airspace.

In summary, there would be no impacts to NTTR airspace management if the proposed action were implemented. Use would increase, but would not adversely impact management or conflict with existing use within NTTR.

Civil and Commercial Aviation Airspace Use

The proposed action would have no impact on civil and commercial aviation airspace use because the F-35 would be operating within the same flight parameters currently used for Nellis AFB terminal and NTTR airspace. As discussed in section 3.2.2, civil air traffic operations at the local airports, on the federal airways and jet routes, and above those highways commonly used as visual references by VFR aircraft are sufficiently clear of and unaffected by Nellis AFB and NTTR operations. These operations and the F-35 beddown would not affect future commercial and general aviation growth in Nevada because they will continue to follow the same flight parameters. Ongoing interaction between Nellis AFB and state and federal agencies will help ensure continued compatibility of military and commercial/civil aviation in the affected environment of Nellis AFB and NTTR airspace.

4.2.2 No-Action Alternative

Under this alternative, no change in baseline conditions would occur and thus no impacts than those found currently. Airspace use in the Nellis AFB terminal airspace and arrival and departure routes would remain the same as described in section 3.2.1. The total number of operations (takeoffs and landings) at Nellis AFB are expected to remain generally the same as recent average levels (about 85,000) since no significant changes are expected in the foreseeable future in Air Force Warfare Center test and training flight mission activities. The no-action alternative would not change the configuration or management of Class B airspace.

Scheduling and use of the four NTTR restricted areas and two MOAs would continue as at present in order to support bombing, gunnery, and electronic warfare training, Red Flag exercises, WS mission employment exercises, and other test and training activities. No changes to the MOA boundaries or their overlying ATCAAs are anticipated under the no-action alternative.

The no-action alternative would have no effect on the airspace and altitudes authorized for supersonic flight within NTTR or on the number and frequency of supersonic operations flown during air-to-air training or other operations where rapid evasion of a simulated threat is necessary. Supersonic flight would continue at the baseline rate discussed previously.

Nellis AFB and NTTR are situated in an area that has had little effect on commercial and general aviation in the region. This is due primarily to the near direct routing provided by federal airways and jet routes for IFR traffic and the visual routes commonly flown by VFR traffic between most airports through this region. No changes are currently planned for the airway/jet route structure surrounding NTTR. Although commercial and general aviation are expected to increase by 54 and 17 percent, respectively, by 2015 (NDOT 2005), such increases would not be affected by Nellis AFB and NTTR operations, which are expected to remain at current levels. The interaction of Nellis AFB operations and airspace management with state and federal agencies provides avenues for discussing any airspace matters.

4.3 NOISE

Noise around Nellis AFB and within NTTR would be affected by beddown of the F-35. By 2022, the number of airfield operations around Nellis AFB would increase to accommodate the additional F-35 aircraft. For this reason, noise was measured under this peak scenario. The airfield analysis uses the most recent noise projections as presented in Figure 3.3-1 (Air Force 2004e).

This analysis quantified noise impacts around Nellis AFB by comparing baseline and projected DNL contours. Impact analysis requires identification of affected areas and land uses. According to the Federal Interagency Committee on Urban Noise, noise exposure greater than 65 DNL is considered generally unacceptable over public services or residential, cultural, recreational, and entertainment areas. This section evaluates the noise generated from the proposed action and its potential effects to the noise environ. Section 4.6 (Land Use) evaluates the effects of noise on surrounding land ownership or land status, population, general land use patterns, land management plans, and special use areas.

As noted in section 4.1, the F-35 will operate within the same NTTR airspace and perform the same type of combat missions as the F-16 and some of the combat missions as the A-10. The projected total activity on the range would increase from the historic range of 200,000 to 300,000 sortie-operations described in section 4.1 to 251,840 to 351,840 sortie-operations. Any differences in noise would be associated with this increase and with the change in aircraft-type mix as the F-35 is introduced. The analysis accounts for both subsonic noise and sonic booms from supersonic flight. Subsonic noise in the NTTR is quantified by DNL. The cumulative sonic boom environment is quantified by CDNL and by the number of booms per month that would be heard at a typical point in each airspace subdivision.

4.3.1 Proposed Action

Nellis AFB

Projected changes to noise levels in the vicinity of Nellis AFB were calculated by using the full complement of 36 aircraft (i.e., 17,280 airfield operations) that would occur in 2022, identifying the flight tracks the F-35 would use, the time in mode for the various airfield operations (provided by the F-35 Joint Program Office), and the day versus night split for operations. The resulting noise contours are presented in Figure 4.3-1. By comparing these contours to the baseline noise environment, and by overlaying the contour plot on a map of Nellis AFB and vicinity, the degree of change and extent of potential noise effects were identified. Table 4.3-1 presents a comparison of total acreage affected by the baseline and projected 2022 noise contours with the percent change from baseline conditions in the total land exposed under each DNL noise level.

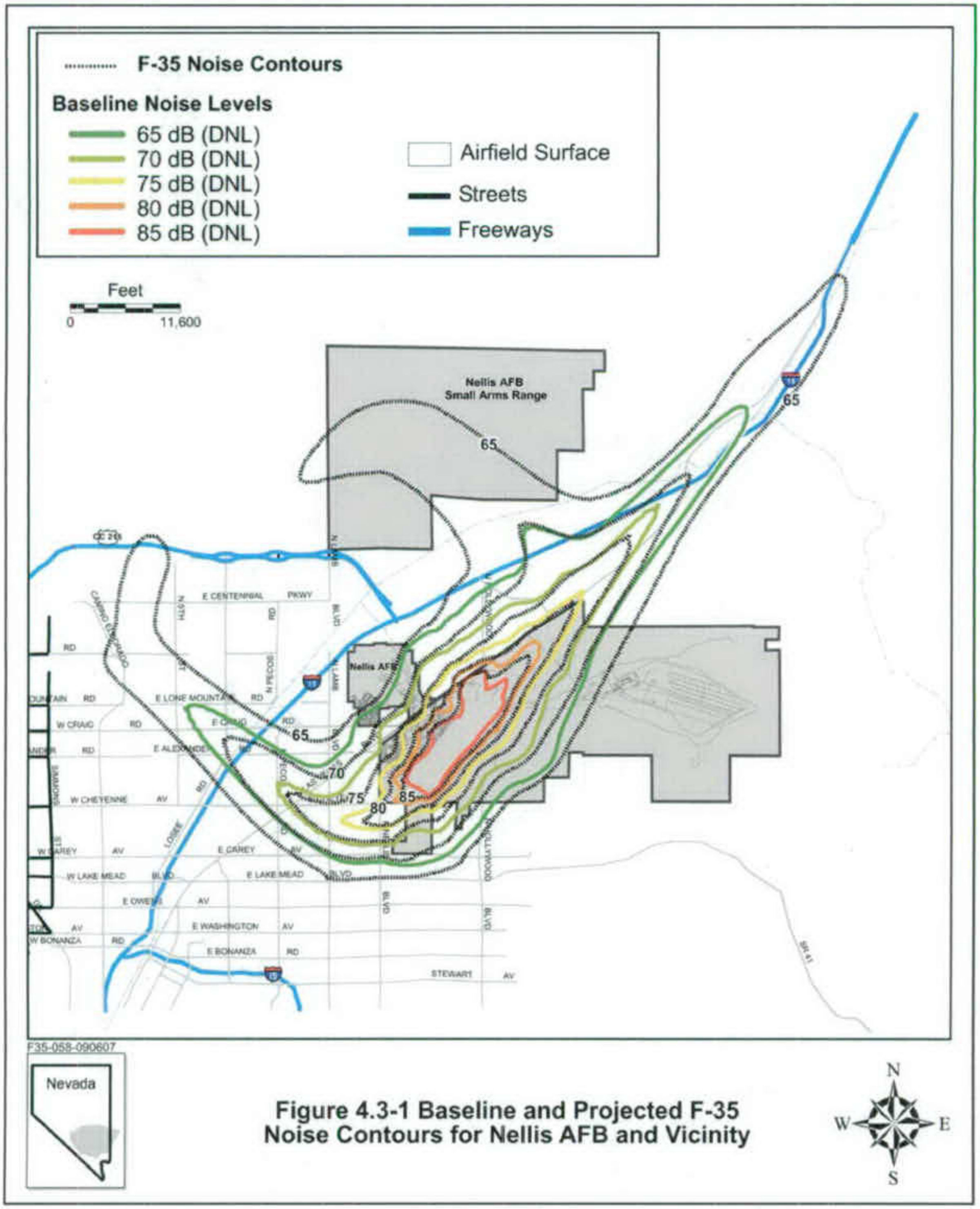


Figure 4.3-1 Baseline and Projected F-35 Noise Contours for Nellis AFB and Vicinity

Table 4.3-1 Projected F-35 Noise Levels Around Nellis AFB (in acres)						
	65-70 DNL	*70-75 DNL*	*75-80 DNL*	*80-85 DNL*	*>85 DNL*	*Total Acreage*
Projected Acres	19,341	7,093	3,702	1,655	1,640	33,431
Baseline	8,882	4,787	2,202	1,066	1,161	18,098
Change from Baseline	10,459	2,306	1,500	589	479	15,333
Percent Change	*118*	*48*	*68*	*55*	*41*	*85*

The additional sorties by the F-35 aircraft in 2022 represent the element of the proposed action with the greatest potential to affect areas subjected to noise at and around the base. By 2022, noise levels would impact a total of 10,459 more acres in the 65 to 70 DNL noise contours and 4,874 acres would be exposed to 70 DNL and greater. Compared to baseline conditions, there would be an approximate doubling in the areas exposed to 65 to 70 DNL noise levels and an average of 53 percent more acreage exposed to greater than 70 DNL noise levels. With this type of increase, it is anticipated that there would be a noticeable increase in noise complaints and levels of annoyance from residents adjacent to the base. Table 4.3-2 illustrates the relationship between subsonic and supersonic noise levels and the percentage of the noise levels and the population highly annoyed according to the Schultz curve (Schultz 1978) (also see Appendix C). The noise generated from the airfield; however, would not be at such a level or last long enough for a person's hearing to be adversely impacted by these noise levels. While there would be a probable increase in the number of complaints and people annoyed, no significant or adverse impacts to human health or hearing would occur. As presented in section 3.3.1, noise abatement procedures are in place to reduce noise levels (Air Force 2005c) and the Air Force would continue these measures under the proposed action.

Table 4.3-2 Relation Between Annoyance, DNL and CDNL		
DNL	*% Highly Annoyed*	*CDNL*
45	0.83	42
50	1.66	46
55	3.31	51
60	6.48	56
65	12.29	60
70	22.10	65

Nevada Test and Training Range

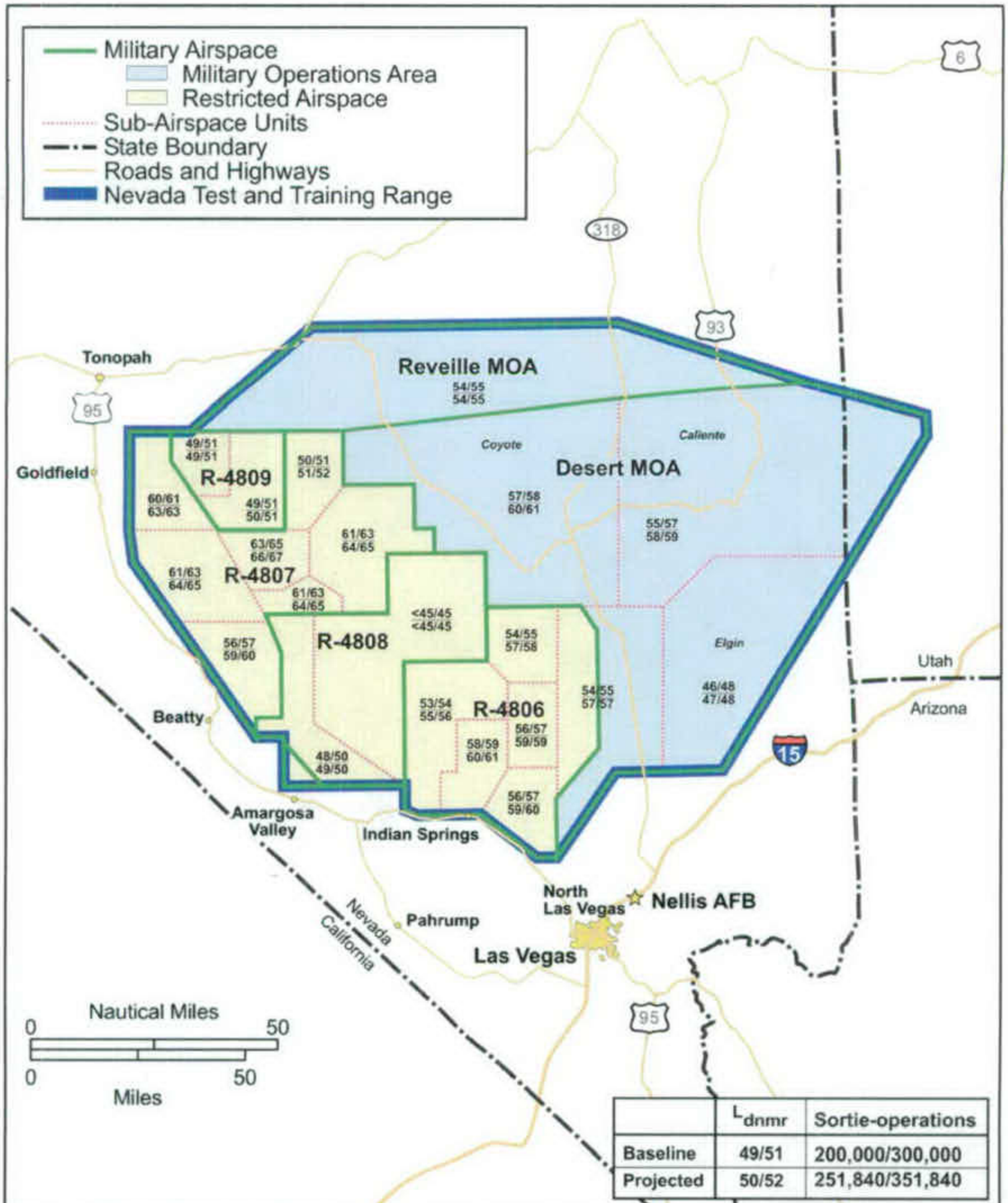
Refer to Table 3.3-2 for subsonic SELs of several aircraft at level flight. SEL noise levels of most aircraft are highest at altitudes below 5,000 feet AGL. Given that 70 percent of F-35 flight activity would occur above 5,000 feet AGL. The proposed action would not significantly increase low-altitude overflights and accompanying noise.

Subsonic noise levels for NTTR would increase (Table 4.3-2 and Figure 4.3-2). Out of 21 airspace units, 12 would experience a 3-dB increase with 251,840 sortie-operations and 4 of the 21 units in the low-use scenario would experience a 3-dB increase with 351,840 sortie-operations. Seven of the twelve airspace units affected by a 3-dB increase consist of restricted airspace where public access is precluded. Under the 351,840 sortie-operations scenario, two of the four units subject to a 3-dB increase comprise restricted airspace.

In summary, it is anticipated that there would be an increase to the number of complaints received by the base and level of annoyance experienced by communities and residents underlying the airspace units with a noise increase due to subsonic operations. Impacts to hearing and health would not be adverse.

4.3-3 Baseline and Projected F-35 Subsonic Noise Levels (L_{dnmr})

Airspace Unit	*Baseline*		*Projected*	
	200,000	*300,000*	*251,840*	*351,840*
Caliente	55	57	58	59
Coyote	57	58	60	61
Elgin	46	48	47	48
Reveille	54	55	54	55
4806R61	54	55	57	58
4806R62	56	57	59	59
4806R63	56	57	59	60
4806R64	53	54	55	56
4806R65	58	59	60	61
Alamo	54	55	57	57
EC South	56	57	59	60
Pahute	61	63	64	65
4807R71	60	61	63	63
4807R74	61	63	64	65
4807R75	63	65	66	67
4807R76	61	63	64	65
4809A	49	51	49	51
EC East	50	51	51	52
EC West	49	51	50	51
4808W	48	50	49	50
4808E	<45	45	<45	45



	L_{dnmr}	Sortie-operations
Baseline	49/51	200,000/300,000
Projected	50/52	251,840/351,840

Figure 4.3-2 Baseline and Projected F-35 Subsonic Noise Levels

The Air Force estimates that during air combat maneuvering, the F-35 would fly supersonic approximately 3.5 percent of the time. Table 4.3-4 and Figure 4.3-3 present the projected CDNL and sonic booms for the NTTR airspace units described in section 3.3. Airspace units not shown are subject to CDNL of less than 45 dB or are not authorized for supersonic flight. Calculations of supersonic noise reflect the number of aircraft operations performed in supersonic mode, not total sortie-operations.

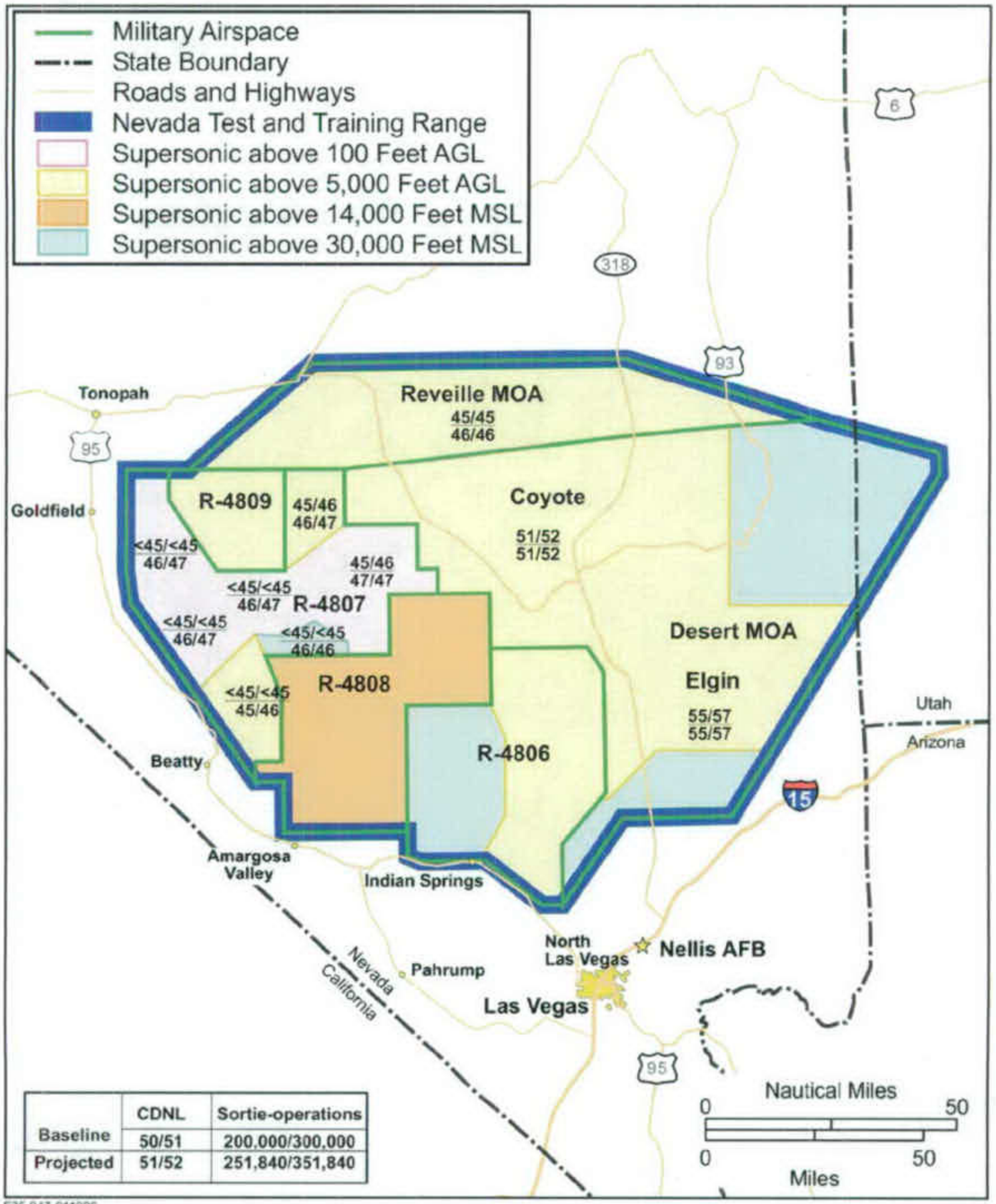
Table 4.3-4 Baseline and Projected F-35 Supersonic Noise Levels and Sonic Boom Frequency

Airspace Unit	Baseline Sortie-Operations				Projected Sortie-Operations			
	200,000		300,000		251,840		351,840	
	CDNL	Booms per month	CDNL	Booms per month	CDNL	Booms per month	CDNL	Booms per month
Elgin	55	24	57	35	55	25	57	39
Coyote	51	10	52	12	51	10	52	13
Reveille	45	2	45	2	46	3	46	3
EC East	45	2	46	2	46	3	47	4
EC South	<45	<2	<45	<2	45	3	46	3
Pahute	<45	<2	<45	<2	46	3	46	3
4807R71	<45	<2	<45	<2	46	3	47	3
4807R74	45	2	46	2	47	4	47	4
4807R75	<45	<2	<45	<2	46	3	47	4
4807R76	<45	<2	<45	<2	46	3	47	4

Under the proposed action to increase sortie-operations to 251,840, CDNLs would increase by 1 dB in the Reveille MOA and 2 dB in portions of R-4807. Monthly sonic booms would increase by two in portions of R-4807, while portions of Desert MOA and Reveille MOA would experience an increase of one boom per month. Under the 351,840 scenario, supersonic noise would increase by only 1 dB in the Reveille MOA and portions of R-4807; the booms would increase by about two in most airspace units, except in the Elgin MOA where booms would increase by 4 per month. Increases of 1 to 2 dB would not be perceptible, especially since noise levels would range from 45 to 57 CDNL. Similarly, an additional sonic boom or two per month would not significantly alter conditions over the vast areas encompassed by the airspace units. It is anticipated, however, that there would be an increase in the number of complaints received and that more people would be annoyed by the supersonic activities. While there is this increase, no adverse impacts to hearing or health would occur.

4.3.2 No-Action Alternative

Under the no-action alternative, the proposed beddown of F-35 aircraft at Nellis AFB would not occur. Implementation of the no-action alternative would not change noise levels and would not change existing impacts to areas in the vicinity of the base or on NTTR.



	CDNL	Sortie-operations
Baseline	50/51	200,000/300,000
Projected	51/52	251,840/351,840

F35-047-011906

Figure 4.3-3 NTTR Baseline and Projected Supersonic Noise Levels

Note: Supersonic and boom calculations apply number of aircraft operations in supersonic, not type.

4.4 AIR QUALITY

Air emissions resulting from the proposed action were evaluated in accordance with federal, state, and local air pollution standards and regulations. Air quality impacts from a proposed activity or action would be significant if they:

- increase ambient air pollution concentrations above any NAAQS;
- contribute to an existing violation of any NAAQS;
- interfere with or delay timely attainment of NAAQS; or
- impair visibility within any federally-mandated Class I area.

The methodology used in the air quality analysis calculated the increase in emission levels due to the proposed action at Nellis AFB and NTTR of both stationary and mobile sources. According to EPA General Conformity Rule in 40 CFR Part 93, Subpart B, any proposed federal action that has the potential to cause violations in a NAAQS nonattainment or maintenance area must undergo a conformity analysis. A conformity analysis is not required if the proposed action occurs within an attainment or unclassified area. Since Las Vegas is in nonattainment status for CO, PM_{10}, and 8-hour ozone, an applicability analysis must be performed to determine if project emissions exceed the *de minimis* thresholds or contribute more than 10 percent of the regional emissions. No applicability analysis is needed for the majority of NTTR airspace because it is not located in any areas of nonattainment or maintenance. The exception is a small portion (5 percent) of airspace found in the southeast corner of R-4806 (refer to Figure 3.3-3 illustrating NTTR airspace). The number of projected F-35 flights in this area would be minor because aircraft do not typically fly in corners and the number of operations below 7,000 ft AGL is very few, therefore, only negligible emissions would be created within that area.

When evaluating potential impacts to air quality, compliance with the Final Conformity Rule is presumed if the emissions associated with a federal action, like the F-35 beddown, are below the relevant *de minimis* thresholds during a given year. Because Clark County is designated by the EPA as being in serious nonattainment for CO and PM_{10}, the *de minimis* thresholds are applied and are 100 and 70 tons per year, respectively. In addition, Nellis AFB is located within an area of Clark County found to be in subpart 1 (basic) nonattainment for 8-hour ozone; the impacts for this criteria pollutant are determined by applying *de minimis* thresholds of its precursor pollutants represented by VOCs and NO_x. *De minimis* thresholds for these pollutants are 100 tons per year for NO_x and VOCs.

4.4.1 Proposed Action

Nellis AFB

The analysis calculated changes in air emissions for those pollutants in nonattainment (CO, VOCs, NO_x, and PM_{10}) as a result of the proposed action, using the same methods and types of input used to determine baseline emissions (see Appendix D). All ground-based emission sources associated with the proposed action were assessed, including construction and demolition activities, F-35 engine run-ups, maintenance, testing, and emissions from AGE supporting the F-35. Emissions associated with F-35 airfield operations accounted for taxi, departures, and approaches within the Nellis AFB airfield environment. On-base vehicle travel by construction workers and F-35 personnel commuting in the Las Vegas Valley was also evaluated. No additional government operated vehicles are anticipated with this proposal; therefore, emissions from these sources were not evaluated.

Construction and Demolition Activities

The emission factors for construction include contributions from engine exhaust emissions (i.e., construction equipment, material handling, and workers' travel) and fugitive dust emissions (e.g., from grading activities). Demolition emissions evaluated include fugitive dust and offsite transport of demolition debris. Trenching and grading emissions include fugitive dust from ground disturbance, plus combustive emissions from heavy equipment from trench work during the entire construction period. Paving emissions include combustive emissions from bulldozers, rollers, and paving equipment, plus emissions from dump trucks hauling pavement materials to the various sites. Emissions would occur over the duration of the construction period, which extends from 2009 through 2014 and are provided in Table 4.4-1 and Appendix D. No additional construction is scheduled for 2012; however, construction initiated in 2011 would be on-going and, therefore, construction workers would continue generating trips through 2012. Also included in these calculations are the emissions associated with construction workers for trips generated on the base and during their breaks. It was assumed that there are enough construction workers in the Las Vegas Valley to support this construction so no new commuting emissions would be incurred; however, it was assumed that workers would travel 6 miles per day within the base and during lunch and breaks.

Table 4.4-1 Nellis AFB Projected Construction Pollutant Emissions (tons/year)				
	CO	***NO_x***	***VOCs***	***PM_{10}***
Nellis AFB Baseline[1]	*942.52*	*346.07*	*345.5*	*63.80*
2009	0.43	1.32	0.11	1.22
2010	5.02	6.11	0.80	3.89
2011	3.29	5.50	0.61	4.25
2012[2]	NA	NA	NA	NA
2013	3.91	7.75	0.92	14.11
2014	2.13	2.07	0.30	1.38
De minimis Threshold	100 tons/year	100 tons/year	100 tons/year	70 tons/year
Regional Significance 10% Threshold	38,785	7,629	5,058	5,329

[1] Total for Nellis AFB.
[2] No construction would occur in 2012.

None of the construction-related activities associated with the proposed action exceeds the CO, PM_{10}, or 8-hour ozone (VOCs and NO_x) *de minimis* thresholds. Specific construction activity assumptions and acreages are provided in Appendix D. CO emissions for construction projects would range from a low of less than 1 ton in 2009 to a high of 3.91 tons in 2013 (*de minimis* is 100 tons). Maximum PM_{10} emissions would be 14.11 tons in 2013 (*de minimis* is 70 tons per year) when more than 21 acres are undergoing development. Ozone-contributing emissions of NO_x would be greatest in 2013 at 7.75 tons and VOC emissions are projected to never exceed 1 ton in any given year. Relative to baseline totals, maximum tonnage for PM_{10} would occur in 2013, increasing by 22 percent that year, in all other years, none of the criteria pollutants would increase more than 7 percent from Nellis AFB baseline conditions; none would represent a regional significance.

F-35 and AGE Emissions

Emissions for the F-35 engine (F-135) were calculated using data provided by the Joint Strike Force Program Office in charge of design and development of the F-35 aircraft. Engine time in modes, taxi-time, approach, and departure parameters from the test F-35 aircraft were used to estimate emissions since this is the best data available at this time (Personal communication, Joint Strike Fighter Team 2007). Please refer to Appendix D for specific information on sources of these engine emissions. Once F-35 *operational* engine data are available, the Air Force will evaluate the emissions and determine whether any changes would require supplemental information be disseminated to the public per 40 CFR Part 1502.9(c). Fighter aircraft AGE was used as a surrogate for emissions following the Air Force's Air Conformity Applicability (ACAM) Version 4.3.3. This model uses generic AGE for all fighter aircraft such as the F-15, F-16, and F-22. These are the best available data due to the fact that the F-35 AGE equipment is still in the research stage and emission indices have not been determined. Appendix D provides specific AGE emissions. Because the proposed action is scheduled to take place over several years, emissions were calculated for the years in which the F-35 would be phased into the Nellis AFB inventory: 2012, 2015, 2017, and 2022.

Construction and Aircraft Emissions

Fluctuations in annual emissions would occur as various phases of the proposed action are completed. Short-term increases in air emissions would result primarily from construction activities; long term increases would occur due to F-35 aircraft operations. During construction, dust control permits would be required for disturbance of areas larger than a quarter of an acre (CCHD 2001). Operationally, all new point sources of emissions such as hangars, jet engine test cells, or other buildings would be subject to existing permitting requirements and the base air emissions inventories would require updates to reflect new point sources of emissions. Modifications to the current base-wide Title V Permit would be required if equipment other than mobile AGE were added or replaced. No modification to the Title V Permit is required for changes or additions to mobile equipment used to maintain or service aircraft on the ground. However, Clark County air quality operating permits for an individual piece of equipment would have to be modified for any change to that equipment. Nellis AFB would apply for all modifications to the Title V Permit and the Clark County air quality operating permits after finalization of equipment needs.

Combined construction and operational emissions were calculated to determine if the proposed action would exceed *de minimis* thresholds and/or contribute 10 percent or more to the regional emissions. Table 4.4-2 presents the anticipated increases in nonattainment pollutant emissions associated with the construction and demolition activities as well as the additions in the personnel commuting, increased aircraft operations, and the AGE used to support its operation. Subsequent years (2015 on) would only involve commuting F-35 personnel and airfield activities (e.g., aircraft and AGE operations) since construction would be completed.

Air emission calculations for the proposed action produced results indicating that overlapping construction years and aircraft beddown activities do not exceed *de minimis* thresholds for any nonattainment criteria pollutant. However, beginning in 2017, when F-35 aircraft reach 24, NO_x emissions will exceed *de minimis* levels by about 24 tons. Once the full complement of 36 aircraft arrives in 2022, NO_x emissions will exceed *de minimis* levels by 85 tons. CO emissions exceed *de minimis* levels in 2022 by 33 tons. While *de minimis* levels are exceeded, they would not meet or exceed regional significance since they would represent less than 1 percent of area emissions in any given year.

The Air Force is working with Clark County DAQEM to include the 185 tons of NO_x emissions into their Ozone SIP Revision and has received a positive response from DAQEM to this request (Appendix D contains a copy of the Air Force request and DAQEM initial response). The Air Force expects to make a positive conformity determination for the increase in ozone precursor emissions resulting from the proposed action. To accomplish this outcome, Clark County DAQEM would either expressly identify the projected NO_x emissions in the SIP (40 CFR Sec. 93.158(a)(1) or determine the emissions would not exceed the SIP's NO_x emissions budget (40 CFR Sec. 93.158(a)(5)(i)(A). Similarly, the Air Force expects to make a positive conformity determination for the increased CO emissions as a result of Clark

County DAQEM determining that the projected increase, together with all other sources of CO emissions in the air basin, would not exceed the SIP's CO emissions budget (40 CFR Section 93.158(a)(5)(i)(A)).

Table 4.4-2 Projected Pollutant Emissions (tons/year) from Combined Construction, Commute, and Aircraft Operations Compared to Conformity Thresholds

[1]*Regional Baseline*	*CO*	*NO_x*	*VOCs*	*PM_{10}*
	387,851	76,295	50,376	53,292
2012				
Aircraft	12.00	28.00	1.00	8.00
AGE	6.08	3.09	0.51	0.16
Commuting Personnel	12.36	0.79	0.98	0.03
Construction Workers Commuting	0.10	0.01	0.01	0
Total	**30.54**	**31.89**	**2.50**	**8.19**
2013				
Aircraft	12.00	28.00	1.00	8.00
AGE	6.08	3.09	0.51	0.16
Commuting Personnel	11.82	0.72	0.91	0.03
Construction	3.91	7.75	0.92	14.11
Total	**33.81**	**39.56**	**3.34**	**22.30**
2014				
Aircraft	12.00	28.00	1.00	8.00
AGE	6.08	3.09	0.51	0.16
Commuting Personnel	11.37	0.67	0.86	0.03
Construction	2.13	2.07	0.30	1.38
Total	**31.58**	**33.83**	**2.67**	**9.57**
2015				
Aircraft	25.00	55.00	2.00	17.00
AGE	12.16	6.18	1.02	0.32
Commuting Personnel	11.37	0.67	0.86	0.03
Total	**48.53**	**61.85**	**3.88**	**17.35**
2017				
Aircraft	50.00	110.00	4.00	34.00
AGE	24.32	12.36	2.04	0.64
Commuting Personnel	19.82	1.17	1.50	0.05
Total	**94.14**	**123.53**	**7.54**	**34.69**
2022				
Aircraft	75.00	165.00	6.00	50.00
AGE	36.48	18.54	3.06	0.96
Commuting Personnel	21.10	1.25	1.60	0.05
Total	**132.58**	**184.79**	**10.66**	**51.01**
Regional Significance 10% Threshold	38,785	7,629	5,058	5,329
De minimis Threshold (tons/year)	100	100	100	70

[1]Clark County 2001 Emissions (USEPA AirData 2007)

Maximum PM_{10} emissions would occur in 2022 and are projected at about 52 tons (*de minimis* is 70 tons). VOC emissions are projected to reach their maximum in 2022, at close to 11 tons (*de minimis* is 100 tons). In terms of percent contribution to the regional air quality, maximum emissions for PM, NO_x, or VOCs would not exceed more than 2.5 percent (NO_x) in any year, far below the 10 percent threshold of significance.

In terms of HAPs, the facilities that could generate additional pollutants (e.g., hush houses, fuel cell maintenance buildings, boilers, and paint booths) are not anticipated to generate more than 2 additional tons of combined HAPs in any given year based on similar facilities and functions that now exist on base. Even with 2 additional tons of HAPs, Nellis AFB's potential to emit would constitute about half (i.e., 13.06 tpy) of the total allowable amount of 25 tpy for all HAPs. Under these conditions, no single HAP would account for 10 tpy or more (personal communication, Mathew 2007). Therefore, HAPs impacts to the regional air quality would neither be adverse nor significant because they still would remain well below the 10 tpy for a single HAP and 25 tpy for combined HAPs.

Nevada Test and Training Range

Total sortie-operations in NTTR would increase to between 251,840 and 351,840 under the proposed action. F-35 aircraft would contribute 51,840 sortie-operations in NTTR per year after 2022. These F-35 activities would represent 21 percent of total sortie-operations in the low-use and 15 percent of total sortie-operations in the high-use scenarios. Since the Air Force anticipates that the F-35 would operate in NTTR more like the existing F-16s, the distribution of total sortie-operations among the various airspace units matches that of the F-16s. Given this distribution, the proportion of 51,840 F-35 sortie-operations (15,552) that would operate below the 7,000 feet AGL (mixing height) would represent 6.2 percent more sortie-operations under the 251,840 scenario and 4.4 percent under the 351,840 scenario. Only these sortie-operations would contribute to emissions; and baseline emissions would increase proportionally (refer to Table 3.4-3).

Total emissions in NTTR, including those by the F-35, would continue to be distributed throughout a volume of air of 13,000 cubic miles. Air quality effects associated with total NTTR aircraft operations would continue to be minor and both Nye and Lincoln Counties are in attainment for all criteria pollutants. In summary, air quality impacts in NTTR airspace would be negligible.

Criteria to determine significant impacts on visibility within PSD Class I areas usually apply to stationary emission sources; mobile sources are generally exempt from permit review. However, for purposes of this analysis, mobile aircraft sources were evaluated. The nearest PSD Class I area to NTTR is Death Valley National Park, approximately 10 miles from the western edge of NTTR. Emissions from aircraft would quickly disperse and would not be expected to affect visual range from a reference point 10 miles away. In summary, impacts on visibility from the proposed action within PSD Class I areas in proximity to NTTR would be negligible.

4.4.2 No-Action Alternative

Under the no-action alternative, none of the construction activities, personnel relocations, or aircraft operations proposed in support of the F-35 aircraft beddown would occur at Nellis AFB, and no proposed F-35 aircraft operations would occur in NTTR airspace. Air pollutant emissions would remain unchanged from baseline conditions under the no-action alternative.

4.5 SAFETY

This section evaluates the proposed action to determine its potential to affect safety risks to military personnel, the public, and property. Fire and ground safety are assessed for the potential to increase risk, as well as the Air Force's capability to manage that risk by limiting exposure, responding to emergencies, and suppressing fires. Analysis of aircraft flight risks correlates projected Class A mishaps and bird-aircraft strike hazards with current use of the airspace to consider the magnitude of the change in risk associated with the proposal. Projected changes to uses and handling requirements of explosives are compared to current uses and practices. If a unique situation is anticipated to develop as a result of the proposed action, the capability to manage that situation is assessed. Finally, when the changes in risk arising from the proposed action are considered individually and collectively, assessments can be made about the adequacy of disaster response planning and the need for new or modified procedures and requirements that may become necessary.

4.5.1 Proposed Action

Under the proposed action, the beddown of F-35s for the FDE program and WS would not significantly change and/or degrade safety conditions at either Nellis AFB or NTTR. The beddown and operations of the F-35 would not influence current safety conditions or procedures.

Nellis AFB

Operations and Maintenance

Operations and maintenance activities conducted on Nellis AFB would continue to be performed in accordance with all applicable safety directives. There are no specific aspects of F-35 operations or maintenance that would create any unique or extraordinary safety issues.

As part of the F-35 beddown, some new facilities would be constructed, and other, older facilities would be demolished. New facilities would include buildings on the flightline to support F-35 operations and maintenance, additional munitions support facilities, storage igloos, expansion of the LOLA to support the increased number of F-35 operations, and a new flight kitchen. No unique construction practices or materials would be required that would change existing safety procedures. During construction, standard industrial safety standards would be followed. No unusual ground safety risks would be expected to arise from these activities.

Fire and Crash Response

Fire and crash response would continue to be provided by the Nellis AFB fire department. Although not anticipated, if new response procedures were required for unique materials used in the construction of the F-35, the Air Force will develop them after the production model F-35 is finalized. Under the proposed action, fire fighters would continue to be fully trained and appropriately equipped for crash and rescue response, the beddown of the F-35 would not change these abilities. Therefore, the proposed action should not adversely impact fire and crash response at Nellis AFB.

Aircraft Mishaps

Historically, when new military aircraft first enter the inventory, the accident rate is higher, making it impossible to predict the potential mishap level of the F-35. Historical trends do, however, show that mishaps decrease the more an aircraft is flown. Over time, operations and maintenance personnel learn more about the aircraft's capabilities and limitations. Some of this experience has already been gained for the F-35 during the research, development, and initial test phase.

By the time the proposed F-35 operations at Nellis AFB begin, the initial OT&E phase of the aircraft's integration into the operational force will have progressed substantially. Significant knowledge will have been gained about the aircraft's safest flight regime. At Nellis AFB, only highly experienced fighter pilots support the FDE phase and develop tactics at the WS. These activities will provide additional data about the aircraft's safe operating parameters and further minimize flight risks. As the programs proceed from 2012 onward, the potential for mishaps would likely decrease to low levels comparable to other fighter aircraft. Since the F-35 design incorporates the most modern technology and knowledge is constantly being gained about the safe operating envelope of the aircraft, the F-35 will operate as safely as, or more safely than, any other aircraft introduced into the Air Force inventory. The majority of flight operations would be conducted over remote areas, where population densities are very low; in the unlikely event that an aircraft accident occurs, it should not create undue risk to people or property on the ground. However, if an accident were to occur, existing response, investigation, and follow-on procedures would be enforced; no new accident response procedures would be required with the F-35 beddown.

Bird/Wildlife-Aircraft Strike Hazards

A total of 233 bird-aircraft strikes have been documented for Nellis AFB over a 14-year period. Implementing the proposed action would not expect to alter this low rate. Two factors support this conclusion: 1) the F-35 would operate like all other fighters that have used Nellis AFB and rarely encounter bird-aircraft strikes, and 2) no aspect of the proposed action would increase concentrations of birds on or near the base. Therefore, BASH is not anticipated to change significantly under the proposed action and not impact this facet of safety at Nellis AFB.

Munitions Use and Handling

On Nellis AFB, numerous new munitions igloos would be constructed within the existing WSA to support F-35 munitions storage. No new safety zones or waivers are anticipated. The proposed action also includes an expansion of the LOLA by 167,322 square feet and would require development of new safety arcs, necessitating the realignment of Hollywood Boulevard. This realignment would ensure the continued safety zone between Nellis AFB and adjacent communities and not pose a significant impact to overall safety conditions.

Nevada Test and Training Range

Fire Risk and Management

Within NTTR, current procedures to minimize ground safety risks associated with air-to-air and air-to-ground training would continue. Operations and maintenance activities on NTTR would continue to be conducted using current processes and procedures. All actions would be accomplished by technically qualified personnel and would be conducted in accordance with applicable Air Force safety requirements, approved technical data, as well as Air Force federal and state occupational, safety, and health standards.

Although use of NTTR would increase overall levels of ordnance, flare use would remain close to baseline levels at a 6 percent increase. A negligible increase at less than 1 percent in fire risk would result. Further into this safety section (under ordnance), details of fire risks associated with the proposed use of flares by F-35s are presented. The land areas surrounding training ranges ensure public protection by restricting presence in the safety areas associated with laser use, emitters, and targets supporting air-to-ground ordnance delivery. Planned disaster response actions and range fire suppression capabilities have proven adequate in the past and would be expected to be adequate in the future. Therefore, no changes to fire and risk management are anticipated and the potential impacts would be minimal, if any.

Aircraft Mishaps

Aircraft mishaps under current operations were assessed considering a range of expected maximum (351,840) and minimum (251,840) sortie-operations. The greatest indicated risk is associated with use of MOA airspace. Throughout the MOA airspace, statistical projections indicate the probability of a Class A mishap of 0.00003 percent per year (Air Force 1999a). Risks associated with aircraft mishaps for aircraft currently using the airspace are anticipated to remain relatively unchanged. The mishap rate and risk of mishaps for a new aircraft like the F-35 may be higher in its early years, but would be expected to decrease through time to lower levels matching other fighter aircraft. As more information about the operating characteristics of the aircraft is gained, the probability and risk of a pilot exceeding its safe operating regime is minimized. Given this historic pattern, reflecting decreased risk over time, F-35 operations in NTTR would not pose significant safety risks.

Bird/Wildlife-Aircraft Strike Hazards

Since 1995, there have been ten documented strikes in NTTR; of these, one resulted in a Class B mishap and three in Class C mishaps. Risk associated with bird/wildlife-aircraft strikes is expected to remain low under the proposed action. The F-35 would fly 70 percent of the time above 5,000 feet AGL, well above the altitude (3,000 feet AGL) where 95 percent of bird-aircraft strikes occur. Therefore, BASH is not anticipated to change within NTTR to a significant degree and represent a negligible impact of the proposed action were implemented.

Ordnance Use

Use of live and training ordnance would continue on NTTR. Training would also continue to employ chaff and flares. The F-35 will also be capable of delivering the JDAM, or equivalent approved ordnance at NTTR. Only trained and qualified personnel would handle ordnance in accordance with all explosive safety standards and detailed published technical data.

The overall type and amount of total ordnance expended would continue near current levels. Added tonnage of ordnance contributed by the F-35 would be less than the normal annual variation on NTTR. Weapons employment procedures are detailed in AFI 13-212, Volume 1/NAFB Addendum A (Air Force 2007a). Operational constraints pertaining to use of specific delivery tactics, ordnance type, or aircraft headings are developed to mitigate any potentially unsafe condition and ensure that ordnance remains within the applicable safety footprint.

No degradation of public safety is expected from release of ordnance by F-35s. As with all aircraft deploying ordnance, weapons safety footprints specifically delivered by F-35s are currently under development. These footprints define safety and operational requirements specific to F-35 ordnance delivery to comply with current safety procedures and restrictions and to ensure all ordnance comes to rest within the approved ranges within NTTR.

Chaff and Flares

Under the proposed action, 74,000 bundles of chaff and 16,000 flares would be released annually by F-35s, contributing about 18 percent of the total chaff and about 6 percent of the total flare use for NTTR. Even with these minor increases, the Air Force expects baseline safety conditions to continue.

As described previously, available information and studies (Air Force 1997a) indicate chaff poses no health risk to humans or wildlife, affects soils and vegetation negligibly, and is unlikely to impact aesthetics. Assuming a conservative average of 3 million fibers per chaff bundle and an even distribution throughout NTTR, F-35 use of chaff would contribute one fiber per approximately 240 square feet. This density would be greater on the NTTR ranges, which the F-35 would use the most, but it would still remain quite low and unnoticeable. Chaff authorized for use on the NTTR ranges has the dipole fibers removed, thereby eliminating interference with FAA radar tracking systems and has been approved for use by the FAA. Potential safety issues related to aircraft and FAA tracking systems have not occurred and are not anticipated in the future.

The F-35 would release flares as part of the FDE program and WS sortie-operations, but this activity would not change existing conditions for safety, fire risk, or natural resources. While the actual flare burn time is classified, the minimum flare release altitude for the F-35 is that altitude which allows the flare to burn out prior to 100 feet above the ground. The MOAs release altitudes provide an additional buffer against burning material contacting the ground and is limited to 5,000 feet AGL or above. However, 70 percent of F-35 flight activities and flare releases would occur at 5,000 feet AGL or higher. Since flare releases would commonly be thousands of feet higher than the minimum release altitude, the potential for burning material contacting the ground would be negligible.

In the unlikely event of an inadvertent release of a flare below the minimum altitude, the risk of a wildfire would remain minimal. As described in section 3.5.2, the probability of a fire starting from a single ignition source such as a flare is extremely low, even with the right fuel, wind, and vegetation conditions. Additionally, flares and flare residues do not pose a health risk to humans or animals because they are not likely to be ingested and the quantities involved are negligible (Air Force 1997a). The very small quantities of flare residues also have little potential to affect soil or water.

4.5.2 No-Action Alternative

Under the no-action alternative, operations on the base and throughout NTTR would be unchanged from current conditions. Ground, flight, and ordnance safety considerations associated with current operations, as discussed in section 3.5, would remain unchanged.

Current operations and training activities on Nellis AFB and within NTTR do not pose a significant safety risk to the public, military personnel, or property. Since these conditions would not change under the no-action alternative, it would not result in significant impacts.

4.6 LAND USE AND RECREATION

Impact analysis for land use requires identification of management plans and use areas, followed by determination of potential effects due to aircraft operations. In this section, the Clark County Airport Noise Environ contours were used as the baseline for comparison since these are the contours applied by the county for planning and development purposes. According to the Federal Interagency Committee on Urban Noise, noise exposure greater than 65 DNL is considered generally unacceptable over public services or residential, cultural, recreational, and entertainment areas. This section focuses on the impacts due to noise from the proposed action on land ownership or land status, general land use patterns, sensitive receptors, land management plans, and special use land management areas.

Potential issues and concerns regarding recreation and visual resources arising from the proposed action include an increase in noise and overcrowding of recreation facilities on base. The methodology for determining impacts on recreation resources focuses on: 1) determining existing users, and 2) determining the noise and visual impacts on recreational use due to a change in sortie-operations on NTTR and airfield operations at Nellis AFB.

4.6.1 Proposed Action

Nellis AFB

On-Base Land Use

Land use on base would not be negatively impacted by the proposed aircraft beddown. Based on the analysis of proposed aircraft operations, Area I and portions of Areas II and III would continue to be exposed to DNL noise levels of 65 dB or greater; however, these proposed noise levels are consistent with existing on-base conditions and facilities and land uses within the noise contours would remain compatible.

The proposed action calls for new on-base facilities and the demolition of older on-base facilities (refer to Figure 2-2). The proposed facilities would be sited to ensure compatibility with existing and proposed on-base land uses. The majority of the facilities would be sited on previously disturbed land within the industrially developed portion of the base or those areas set aside for munitions storage. The siting of the facilities would be consistent with the present land use and the Nellis AFB General Plan.

Off-Base Land Use

This section compares the projected F-35 noise contours to the existing land uses, zoning, and ordinances associated with the Clark County Airport Noise Environs (see Section 3.6.1, Nellis AFB, Off-Base Land Use for discussion). Figure 4.6-1 depicts the relationship of noise generated at the peak-time (2022) of the F-35 beddown to the land uses in the vicinity of Nellis AFB. The lands to the north and east consisting of primarily private lands and open lands managed by the BLM, totaling 15,654 acres, make up 81 percent of the area likely to be affected by noise greater than 65 DNL (refer to Table 3.6-4 and Table 4.6-1).

Table 4.6-1 Projected F-35 Noise Levels Relative to Clark County Noise (in acres)						
	65-70 DNL	***70-75 DNL***	***75-80 DNL***	***80-85 DNL***	***>85 DNL***	***Total***
Projected Acres	19,341	7,093	3,702	1,655	1,640	33,431
Clark County Airport Noise Environs[1]	17,755	9,281	3,778	1,734	1,619	34,167
Change from Projected	***1,586***	***-2,188***	***-76***	***-79***	***21***	***-736***
Percent Change	***8%***	***-31%***	***-2%***	***-5%***	***1%***	***-2%***

Existing industrial, commercial, and agricultural land uses would not be affected by the change in noise contours. These land uses would continue to fall under the noise levels considered consistent with recommendations for compatible use (refer to Table 3.6-1). As shown in Table 4.6-2, 33 percent of the land under noise levels of 65 DNL or higher would consist of open lands without development, as compared to approximately 13 percent (refer to Table 3.6-5) under current conditions. The proportion of affected land classified as public and recreational would decrease relative to the total affected acres. The proportion of residential lands would decrease by 2 percent, as compared to the total; the actual area of affected residential land would increase by about 59 acres.

Table 4.6-2 Land Use Within Projected F-35 Noise Levels Around Nellis AFB (in acres)							
Land Use Category	***65-70 DNL***	***70-75 DNL***	***75-80 DNL***	***80-85 DNL***	***> 85 DNL***	***Total Acres***	***Total (%)***
Commercial	174	155	0	0	0	329	1%
Industrial	2,081	2,255	1,557	155	2	6,049	18%
Open	8,904	1,787	372	0	0	11,063	33%
Public	353	157	69	2	0	581	2%
Recreational	0	0	0	0	0	0	0%
Residential	2,481	1,083	274	132	0	3,970	12%
Military	5,348	1,657	1,429	1,366	1,638	11,439	34%
Total	**19,341**	**7,093**	**3,702**	**1,655**	**1,640**	**33,431**	**100%**

Noise contours exceeding 80 DNL would cover lands primarily on Nellis AFB. However, the noise above 65 DNL could affect a total of about 64,867 people, an increase of about 13,917 people over existing conditions (refer to Tables 3.8-1 and 4.8-1). People within these areas are already exposed to noise levels within 3 dB or less relative to projected levels and the perceived increase in loudness may be minimal. For example, an increase of 10 dB is necessary for a perception of noise as twice as loud (FICON 1992).

[1] These contours are used by Clark County for zoning and land use but do not match current baseline conditions for Nellis AFB.

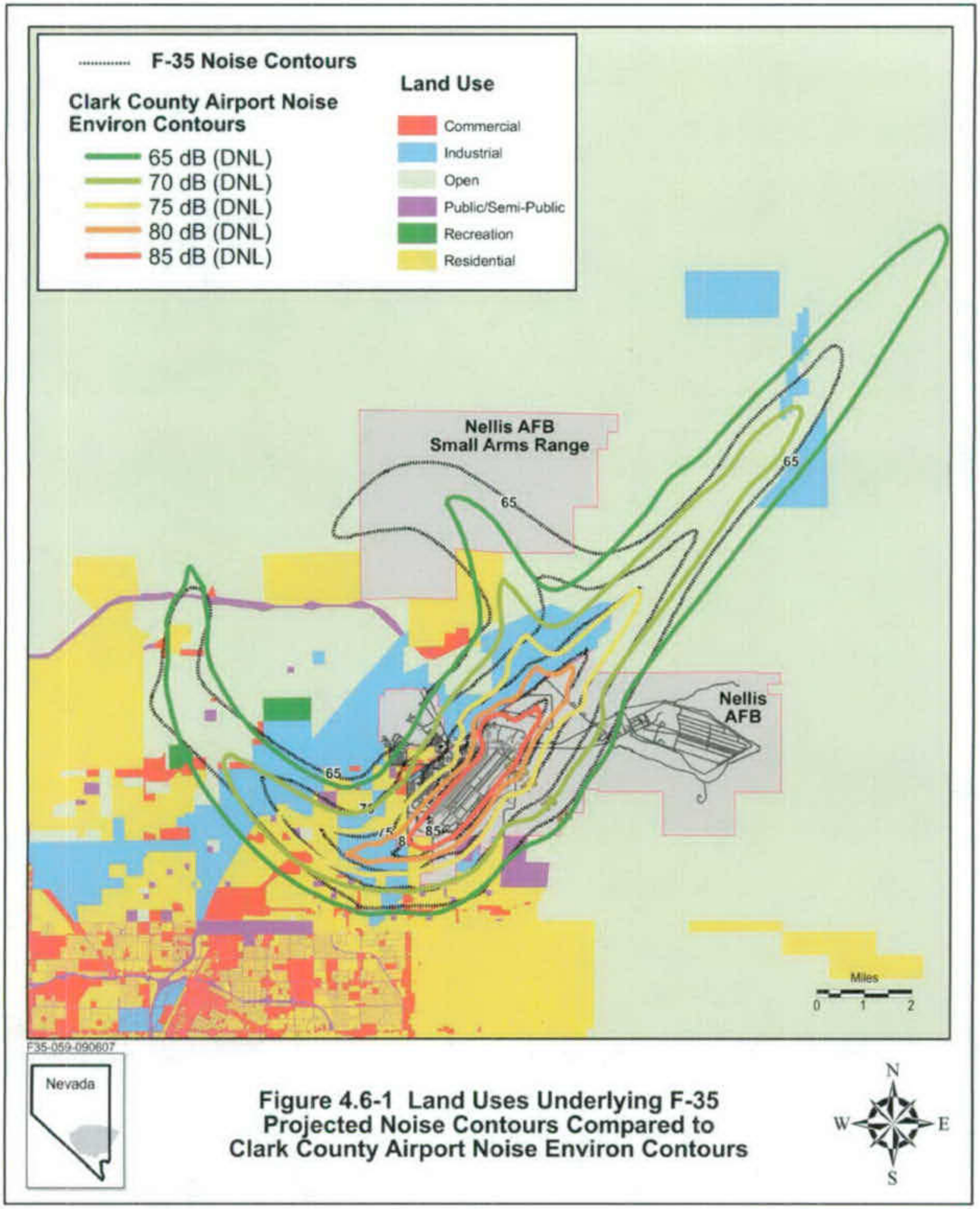


Figure 4.6-1 Land Uses Underlying F-35 Projected Noise Contours Compared to Clark County Airport Noise Environ Contours

Note: Clark County airport environ contours (per county ordinance) are applied in this analysis because the County uses these for land use and zoning purposes. These contours continue to apply until consultation with the Air Force necessitates a change.

In total, 35 schools, churches, or parks are currently within areas with noise greater than 65 DNL. Under the proposed action, an additional 11 noise-sensitive receptors would be affected, mostly within the 65 to 75 DNL contours; however, the number of schools and churches impacted would decrease by two in the 75 to 80 DNL contour (Table 4.6-3).

Table 4.6-3 Noise Sensitive Receptors within Existing Zoning and Projected Noise Contours

Noise Receptor	*65-70 DNL*		*70-75 DNL*		*75-80 DNL*		*>80 DNL*	
	Baseline	*F-35*	*Baseline*	*F-35*	*Baseline*	*F-35*	*Baseline*	*F-35*
Schools	10	14	2	6	1	0	0	0
Churches	9	12	3	6	1	0	0	0
Parks	5	5	2	1	1	1	1	1
Total	**24**	**31**	**7**	**13**	**3**	**1**	**1**	**1**

Although noise levels for the 3,970 acres of residential land, potentially affected by the proposal, would exceed common recommendations (FICON 1992), most areas under the projected noise contours would fall within areas already zoned for these levels (Air Force 2004e). Residential and other noise sensitive developments are generally not encouraged in any of the noise exposure zones; however, residential developments currently exist in those zones. To minimize exposure to noise sensitive land uses, permitted uses and building construction are regulated in the environs of Nellis AFB (Clark County 1998), and various levels of noise attenuation in building construction (i.e., "sound proofing" for interior noise reduction) are required by the county. Residential areas located to the south and west of Nellis AFB would continue to be exposed to noise levels of 65 to 80 DNL under the proposed action, but would occur in areas exposed to these noise levels in 2003 (Air Force 2004e). Land under the projected 65 DNL noise contour and east of Nellis AFB that was not exposed to noise exceeding 65 DNL in 2003 is primarily open land (see Figure 4.6-1).

Some land use would be incompatible with noise levels in the vicinity of Nellis AFB. Even with noise attenuation standards, land use and zoning regulations applicable to areas adjacent to the base would be incompatible with both current and expected noise levels generated by aircraft operations at Nellis AFB. The noise increase to residential areas is also most likely to affect areas exposed to higher noise levels in 2003 and in areas currently zoned for these noise levels. Therefore, FICON (1992) guidelines regarding changes over 3 dB do not apply (Appendix C). Further residential development in inappropriate noise exposure zones can be avoided by proper zoning enforcement. If Clark County and the City of North Las Vegas approve rezoning and enforce building regulations, further public annoyance may be significantly reduced.

The Air Force already employs measures to reduce aircraft noise effects and would continue them under the proposed action. Air Force responsibilities for flight activities include the following (Air Force 2004e): flight safety, noise abatement, and participation in the land use planning process as was mentioned in section 3.6. The following actions reduce noise levels and land use incompatibility and would continue to be enforced under the proposed action:

1. Flying Safety—The Air Force would continue to maintain aircraft and train aircrews to avoid aircraft accidents. They also maintain CZs and fly, as much as possible, over sparsely populated areas. The FDE program and WS beddown of the F-35 would not affect CZs or safety procedures because they would have to follow these established procedures.
2. Noise Abatement—Nellis AFB would continue to restrict nighttime flying activities and route flights to have the least effect on populated areas. Other measures include changes in flight altitude. These procedures will remain in effect under the F-35 beddown proposed action.
3. Participation in Land Use Planning—The Air Force will continue to participate in land use discussions with governmental parties. The Air Force would continue these discussions in the future and make recommendations to planning and zoning jurisdictions and city councils on the types of land uses that are compatible. Therefore, these procedures would remain unaffected if the proposed action were implemented.

Recreation

As a result of the proposed action, a minimal increase of personnel using on-base facilities could occur by 2022. Recreation activities and sports leagues are evaluated annually. Influxes of personnel are common on the base due to the large number of temporarily assigned personnel. Therefore, an increase in base personnel as a result of the proposed action would not adversely affect recreation activities on base. Recreation is not expected to be affected by noise resulting from the proposed aircraft operations because these noise levels are consistent with the existing base noise environment.

Currently, there are five local parks within the 70 DNL noise contour (see Figure 4.6-1); the number of parks affected would not change under the proposed action. The 70 DNL noise level is considered an acceptable level in accordance with current Clark County regulations. An additional seven noise-sensitive receptors (i.e., schools and churches) would fall within the 65 to 70 DNL contour which is within acceptable levels. In summary, land use and recreation resources at Nellis AFB would be impacted; however, the overall impact would not be adverse.

Nevada Test and Training Range

Land Use

The additional sortie-operations and activities by the F-35 aircraft represent the element of the proposed action with a potential to affect land use under NTTR. Such impacts would be indirect, stemming from aircraft overflights and aircraft noise and should represent only negligible impacts to land use.

Under the proposed action, land status and land use patterns within NTTR would not be altered. Since land uses in this area have remained the same for many years and have been exposed to aircraft operations since the formation of Nellis AFB in the 1940s, the changes in use associated with the proposed F-35 beddown have a negligible potential to impact land use. First, subsonic noise levels could change by up to 3 dB, but given the expanse of the area affected, the amount of lands within the range, and the past exposure of the lands to aircraft noise, the change in noise levels would not impact land use (see Section 4.3, Nevada Test and Training Range). Second, increases in supersonic flight activity would result in a minimal increase in the number of sonic booms experienced at ground level. Sonic booms would be 2 or less per month except in Desert MOA/Elgin airspace where booms would increase by 4 per month. Increases in sonic booms in R-4807 would not affect land use because the area is already restricted from public access. Since the increase in sonic booms beneath the Elgin airspace in the Desert MOA are minimal (2 per month), and because the intensity of booms reaching the ground would be similar to existing conditions, impacts to land use resulting from sonic boom exposure would not be adverse.

Recreation

Access by the public to NTTR withdrawn areas is restricted; therefore, very little recreation activities occur there. Hunting is the only recreational activity allowed on NTTR. Only under permit conditions and existing MOUs are recreational visits allowed. Because the proposed action does not require a change in access for hunting, would not change the amount of land available for hunting, and would present a minimal impact to wildlife hunted (e.g., mule deer), hunting opportunities are not expected to change. Hunting on the range would continue to be coordinated with the NDOW and USFWS.

Subsonic noise levels vary over NTTR, from 45 DNL to 67 DNL (refer to Figure 4.3-2). Much of the airspace associated with NTTR is located over DoD or DOE controlled land with restricted recreation use. Underneath NTTR, increases in subsonic noise levels would not increase by more than 3 dB; therefore, impacts are expected to be negligible.

Average supersonic exposures would increase as a result of the proposed action. Under the Desert MOA/Elgin airspace, the average number of sonic booms would increase from 24 to 25 booms per month under 250,000 sortie-operations and from 35 to 39 under 350,000 sortie-operations. Under the Desert MOA/Coyote airspace, the average number of sonic booms would increase from 12 to 13 under 350,000 sortie-operations. Under the Reveille MOA, the average number of sonic booms would increase from 2 to 3 booms per month. There are a number of recreation areas under these MOAs (see Figure 3.6-6) including Key Pittman Wildlife Management Area, White River Petroglyphs site, Beaver Dam State Park, and Ella Mountain. These sonic booms could be perceived as annoying to recreation visitors in a wilderness setting. However, due to the subjective nature of annoyance from noise disturbance and because the area is currently subject to sonic booms, some visitors would not be annoyed by the increase. Recreation visitors in developed areas would probably not be affected, because these areas tend to have higher ambient noise levels.

In all other MOAs and restricted airspace, the frequency of sonic booms is expected to increase by 1 boom per month except for EC East and portions of R-4807, which would increase by 2 booms per month. However, no recreation is permitted in this area; therefore, no adverse impacts are expected under the proposed action.

4.6.2 No-Action Alternative

Under the no-action alternative, there would be no beddown of the F-35 FDE program and WS at Nellis AFB. Implementation of this alternative would not affect land management or use. Access to and availability of recreational resources would remain unchanged. Military aircraft would continue to use NTTR, noise would not increase, and visual resources would remain unchanged. Therefore, under this alternative, no further impacts to land use or recreation resources are expected.

4.7 SOCIOECONOMICS AND INFRASTRUCTURE

Analyses of potential impacts to socioeconomic resources performed for this EIS considered both economic and social characteristics of the affected environment. These characteristics include the size and demographic composition of the population; employment, income, and other general economic indicators; and population-related resources such as housing and public schools.

Assessment began with a determination of the economic impact of current operations at Nellis AFB presented in section 3.7. Data used to summarize current conditions were obtained from the Nellis AFB Personnel Office; data for Clark County were obtained from the U.S. Census Bureau and Clark County Finance and Public Works web sites. Assessment of the base's current socioeconomic impact on the affected region enables the most accurate projections possible of potential impacts to affected resources upon implementation of the proposed action.

4.7.1 Proposed Action

Population

Nellis AFB would experience an increase of active-duty personnel associated with the F-35 FDE program and WS beddown proposal beginning in 2012 and peaking in 2022. The total change would result in a net increase of 412 active-duty personnel at Nellis AFB in FY22. On average, each military staff member is anticipated to have 2.04 dependents and this was used in calculating potential affects of the proposed action (Air Force 2006a). Table 4.7-1 provides base population changes associated with the proposed action.

Table 4.7-1 Comparison of Existing and Projected Staff and Dependents at Nellis AFB

	Staff	***Dependents***	***Total***
Existing Baseline (2006)	12,284	25,059	37,343
Projected 2012	12,395	25,286	37,681
Projected 2015	12,506	25,512	38,018
Projected 2017	12,681	25,869	38,550
Projected 2022	12,696	25,900	38,596
Change in Baseline	**412**	**841**	**1,253**

Under the proposed action, the Nellis AFB active-duty and civilian personnel would increase by approximately 3.4 percent when compared to the existing baseline. When compared to the 2005 population of Clark County, this represents a less than 0.03 percent increase. This increase would not have an adverse impact on local or regional demand on community services, utilities, or housing. In addition, normal fluctuations in personnel and the rate of rapid growth in the region would likely make this change unnoticeable.

Ancillary increases to the local population are impossible to accurately predict but could be as many as several hundred. The majority of these personnel would be contractor employees of construction firms and the aircraft manufacturers. Fluctuations in programs, funding, and staffing would continue at Nellis AFB, likely making such a minor change unnoticeable.

Employment and Earnings

Employment

In 2006, the workforce at Nellis AFB was composed of 12,284 persons (Air Force 2006a). As one of the single largest government employers in Clark County, Nellis AFB and its continuing operations represent a major source of local (i.e., North Las Vegas) economic activity. Because Nellis AFB is among the area's largest employers, the gain of 412 personnel positions would not have a noticeable impact on employment when placed in context with the regional environment of Clark County and Las Vegas.

Construction activity associated with the beddown decision would peak in FY10 with project expenditures of over $131 million. Construction activity would contribute to the local economy although the potential effects would be minor and temporary. Construction costs under the proposed action would be minor in comparison to the billions of dollars generated in the Las Vegas region.

Earnings

Nellis AFB is a major employer in the region, with total annual payroll expenditures of more than $857 million in FY06 (Air Force 2006a). Active duty military personnel at Nellis AFB received on average $68,687 annually. Based on this FY06 average, the addition of 412 personnel at Nellis AFB associated with the proposed action would generate nearly $28.3 million in payroll disbursements in the region representing approximately 3.3 percent of the Nellis AFB FY06 payroll.

Infrastructure

Housing

Construction has been one of the fastest growing employment sectors in the Clark County over the past 20 years. Much of this growth is attributable to rapid population growth and corresponding increased demand for affordable, quality housing in the region. Between 2012 and 2022, a slight need for off-base housing units may arise for those persons arriving in the area, but with the growth in the Las Vegas regional housing supply projected to continue, sufficient and suitable (e.g., new) off-base housing would be available to personnel associated with the proposed action.

The military family housing combined with the expanding off-base supply would be sufficient (and inherently suitable) to accommodate personnel changes associated with the proposed action.

Public Schools

In the 2006/2007 school year, a total of about 302,773 students were enrolled in 326 Clark County schools (Clark County 2006b). The Air Force estimates that during years 2012 to 2022, the student population in the Clark County School District would increase, peaking in 2022 with about 400 new pupils due to the increase of active-duty personnel at Nellis AFB. This student growth would occur over the 10-year period, and the increase would be negligible compared to the rapid growth of Clark County.

These schools would continue to receive federal Impact Aid for each child attending school off base in lieu of taxes.

Utilities

Electric Power and Natural Gas

There would be no appreciable change in demand for utilities under the proposed action; utility use would be minimally above baseline or no-action conditions. New facility construction under the proposed action would likely employ new energy efficient hot water boilers and cooling systems to reduce the impact on the existing electrical infrastructure. Minor upgrades to the existing electrical system (i.e., electrical pole replacement and circuit feeder enhancements) identified in the *General Plan for Nellis Air Force Base* (Air Force 2002a) would ensure capacity would be adequate to meet the new requirements.

Potable Water

Demand for potable water is expected to increase with the addition of aircraft, personnel, and dependents under the proposed action; however, water supplies would be sufficient to meet future demands. Construction activities over an 8-year period and gradual personnel increases of about 3.5 percent (beginning in 2012 and peaking in 2022) would be expected to increase water consumption; however, the increases would not be expected to have an appreciable effect on the availability of groundwater at Nellis AFB or in the surrounding areas. In 2004, the base consumed a total of 3.5 million gpd (personal communication, Roe 2007). Full implementation of the F-35 programs in 2022 would result in use of approximately 446,000 gpd. Nellis AFB currently is allotted 7.1 million gpd (combined surface and groundwater sources). Overall, water usage would increase from implementation of F-35 program activities and the addition of 412 base personnel and their dependents, but the affect on the availability of groundwater at Nellis AFB or in the surrounding areas would be minimal, would be well below the base's allotment, would occur over a 10-year period, and would not require Nellis AFB to seek additional water rights.

Wastewater Treatment

No adverse or significant impacts to wastewater treatment would be anticipated under the proposed action at Nellis AFB. Clark County Water Reclamation District's Main Facility treats over 96 million gpd of wastewater and is currently being upgraded to 110 million gpd (CCWRD 2007). Proposed F-35 activities along with increased base personnel and dependents would generate less than one half million gpd of wastewater to be treated, which would represent less than 0.5 percent of the CCWRD Main Facility capacity.

Transportation

The Nellis AFB roadways would experience increased traffic levels associated with construction equipment; the increased levels may create congestion during peak traffic periods (i.e., morning and evening rush hours). Traffic levels on the base would be moderate to high during the construction period. Although effects of projects under the proposed action on existing transportation resources would be noticeable, they would be temporary and localized in portions of the base. Nearby Las Vegas and Nellis Boulevards, Craig Road, and I-15 would be able to accommodate the anticipated temporary level of increased construction traffic.

Employment on the base in 2006 was approximately 12,284 jobs of which approximately 10,083 employed persons (i.e., military and civilians) lived off base. Data collected by the Bureau of Transportation Statistics indicate approximately 87 percent of vehicular travel is via personal vehicle. This percentage has been used to estimate the potential for approximately 8,772 vehicle trips during each peak travel period in the vicinity of and on Nellis AFB (BTS 2001). The anticipated increase of active-duty personnel (see Table 4.7-1) during years 2012 to 2022 could impact on-base traffic patterns. However, the additional personnel numbers would fall within normal variation for the base and would occur over a 10-year period. The increased personnel and associated traffic would not be expected to have a discernible affect on traffic at access gates or adjacent intersections.

4.7.2 No-Action Alternative

Under the no-action alternative, there would be no beddown of the F-35 FDE and WS at Nellis AFB. Implementation of this alternative would not affect the socioeconomic resources and opportunities associated with Nellis AFB or Clark County. In addition, infrastructure resources would not be impacted by selection of this alternative.

4.8 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

4.8.1 Proposed Action

For the proposed action, noise levels of 65 DNL or greater were identified. The affected population under these areas was determined using USCB 2005 census zone data to calculate the percentage of residential land use under each noise contour. The original population estimates were then multiplied by the residential portion to achieve the population estimates under each noise contour.

Nellis AFB

Minority and Low-Income Populations Affected by Noise Greater than 65 DNL in the Vicinity of Nellis AFB

	Baseline	***Projected***
Total Population	50,950	64,867
Minority	22,118	27,007
Low-Income	8,004	10,387

Minority and Low-Income Populations

Currently, baseline noise levels of 65 DNL and greater affect 43 percent minority and 16 percent low-income populations of the total population in the vicinity of Nellis AFB (refer to Table 3.8-1). Many of these persons live in the residential areas associated with Sunrise Manor and other unincorporated communities near the base. As such, these groups bear a greater share of noise impacts than the surrounding population as a whole.

Under the proposed action, noise levels would increase into areas off base; however, the percentage of minority populations currently affected by noise levels of 65 DNL and greater would decrease slightly to 42 percent while low-income populations affected would remain at 16 percent (Table 4.8-1).

Zoning regulations currently require all residential construction within areas affected by noise levels of 65 DNL or greater to include noise attenuation features. Noise attenuation from current standard construction practices can reduce indoor noise by 20 dB or more (Department of the Navy 2005). The Air Force will continue to work with Clark County and other local officials who seek to establish or modify noise attenuation measures. The Air Force will also continue to employ noise abatement procedures around the base including expedited climb-outs for all aircraft and restrictions on the time and the direction of flight activities.

Table 4.8-1 Minority and Low-Income Populations in the Vicinity of Nellis AFB Affected by Noise Greater than 65 DNL under the Proposed Action					
DNL	***Total Population***	***Minority Population***	***Percent Minority***	***Low-Income Population***	***Percent Low-Income***
65 – 70	40,331	15,913	39%	5,848	15%
70 – 75	19,041	8,898	47%	3,554	19%
75 – 80	5,445	2,176	40%	978	18%
80 – 85	50	20	40%	6	12%
> 85	0	0	0%	0	0%
Total	**64,867**	**27,007**	**42%**	**10,387**	**16%**

Source: USCB 2006b– based on 2006 Population Estimates and 2000-2005 Poverty Estimates and Southern Nevada Consensus Population Estimate, July 2005.

Protection of Children

Under the proposed action, 7 additional schools in the vicinity of Nellis AFB would be exposed to noise levels 65 DNL or above. The Nellis Terrace Housing Area and Lomie G. Heard Elementary School are currently exposed to noise levels of 70 DNL and greater and this would not be expected to change under this proposal. The beddown of F-35 aircraft would not result in a shift in location or change in shape of affected CZs or APZs (i.e., safety zones); therefore, no change in regards to the safety of children on the base and within the local community would be expected. No environmental restoration sites are located in areas of the base that would pose a potential health risk to children.

In summary, Nellis AFB will continue to work with Clark County and other local officials to support enforcement of existing zoning ordinances and to assess the adequacy of noise abatement measures. If changes are found to be needed to address noise conditions, the Air Force will assist local officials who seek to establish or modify noise attenuation measures.

4.8.2 No-Action Alternative

Under the no-action alternative, there would be no beddown of the F-35 FDE program and WS at Nellis AFB; therefore, impacts to human health and environmental conditions in minority and low-income communities would remain unchanged compared to the action taking place. Potential risks to the safety of children would remain at *status quo* under the no-action alternative.

4.9 SOILS AND WATER RESOURCES

Analysis of the potential impacts to soil and water resources employs the following steps: identifying locations where the actions may directly or indirectly affect soil resources, defining the nature of the affected earth resource, and evaluating the degree to which the characteristics, abundance, or value of the resource would be altered, depleted, or degraded. In terms of water resources, no aspects of current operations at Nellis AFB affect either hydrologic setting or water sources; this would not change under the proposed action. Therefore, this analysis focuses on potential effects on water use, availability, and quality.

Since changes associated with the proposed action in NTTR would not alter any existing soil or water resource conditions due to ordnance delivery, range maintenance, and overflight activities, this section discusses only potential impacts on Nellis AFB.

4.9.1 Proposed Action

Soils

The potential for impacts from the proposed action on Nellis AFB would be associated with construction of new facilities and, to a lesser degree, alteration of existing facilities. Soil loss and erosion could potentially take place is discussed below.

Approximately 36 acres would be disturbed over the 8 years of construction activities. Site grading associated with construction of the flightline, munitions, administrative, support, and housing facilities as well as the Hollywood Boulevard realignment and infrastructure (e.g., communication, power, and water lines) upgrades would be the primary activities with the potential to affect soil resources. Grading would cause loss of some disturbed ground cover for new facilities, which would increase the potential for soil erosion. However, several factors indicate that erosion and soil loss would be negligible. First, most of the proposed construction would occur on previously developed land or replace existing buildings. Second, construction activities would take place over 8 years, limiting the total area exposed to erosion at any one time. Third, low precipitation (4 inches per year) and low runoff (0.2 to 2.1 inches per year), combined with the flat topography of the base, would substantially reduce the potential for erosion. Fourth and lastly, Air Force and Clark County requirements to employ standard construction practices (e.g., soil stockpiling, watering, covering, and wind restrictions) would further limit both wind and water erosion. Based on these factors, construction grading would not measurably degrade soil resources through erosion or loss.

Water Availability, Quality, and Stormwater

Under the proposed action, potential impacts to water availability and quality would be greatest when construction activities coincide with personnel increases in the years 2012 to 2022. Therefore, these are the years that are being evaluated. In terms of surface waters, no appreciable effects are expected at Nellis AFB or in the surrounding areas. Surface water for Nellis AFB is transported via pipelines from Lake Mead. Sources of groundwater are available from the principal alluvial-fill aquifer underlying the Las Vegas Valley. Although proposed changes in operations and personnel would increase the use of water during years 2012 to 2022, the increase in personnel would be only about 3.5 percent at its peak in 2022, and on-base construction would be temporary. Use of water for F-35 program activities (e.g., aircraft washing) and on-base personnel would minimally increase at Nellis AFB but would be well within the amount of water allocated to the base. Currently, Nellis AFB is allotted about 7.1 million gpd (combined surface and groundwater sources) and uses an average of 2.5 million gpd between October and April to 5.4 million gpd from May to September. Full implementation of the F-35 FDE program and WS in 2022 would result in approximately 355,180 gpd to 446,419 gpd increased water use—a 5 to 6 percent increase. This increase is well within Nellis AFB's water allocation and would not require Nellis AFB to seek additional water rights.

Projected on-base construction would disturb existing groundcover, but the potential for soil loss, erosion, and sedimentation would be temporary and limited in scope. Required use of best management practices (soil cover, watering, and stockpiling) would further reduce this impact.

The proposed action includes paving and construction of buildings with impermeable surfacing. During construction at Nellis AFB, soils would temporarily be exposed to compaction, impeding drainage and reducing water infiltration. In other areas, such activities could increase runoff volumes and could alter current hydrological processes. However, the base lacks significant open water bodies. Since no surface water resources of consequence are located on base, implementation of the proposed action would not significantly impact surface water. Existing stormwater control measures as well as adherence to spill prevention and countermeasure plans would provide for protection of surface water sources during construction and use of facilities, so the potential for base or off-base surface water quality to be affected would be negligible.

Construction and paving associated with the proposed action would result in slightly fewer acres available to facilitate groundwater recharge, but the impact would be negligible given the low average annual precipitation and the lack of year-round surface water on base. Infiltration historically and naturally has been a minimal source of recharge.

No floodplains are found on base. Since the existing potential for flooding on Nellis AFB is minimal, the proposed action would not increase flood hazards on the base.

4.9.2 No-Action Alternative

Implementation of the no-action alternative would result in no change in activities at Nellis AFB. As a result, no change in topography or soil erosion would occur. Furthermore, no change in water uses, availability, or quality would be expected. Therefore, no changes in baseline conditions to surface water or groundwater would occur if the no-action alternative were implemented.

4.10 BIOLOGICAL RESOURCES

Determination of the significance of potential impacts to biological resources is based on: 1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource, 2) the proportion of the resource that would be affected relative to its occurrence in the region, 3) the sensitivity of the resource to proposed activities, and 4) the duration of ecological ramifications. Impacts to biological resources are significant if species or habitats of special concern are adversely affected over relatively large areas or disturbances cause reductions in population size or distribution of a species of special concern.

This section analyzes the potential for direct or indirect impacts to biological resources from implementation of the proposed action. Direct impacts would be associated with the proposed construction and operation of facilities at Nellis AFB and direct and indirect impacts could result from the proposed operation of the F-35 within NTTR.

4.10.1 Proposed Action

Nellis AFB

Vegetation

The proposed action would require the construction of new facilities, demolition of older facilities, and improvements to infrastructure. Since construction activities, structural modifications, and demolition associated with the proposed action would occur predominantly in previously disturbed areas that currently support no sensitive plant species or wetlands, there would be no adverse impacts on vegetation at Nellis AFB.

Wetlands and Jurisdictional Waters of the United States

No designated wetlands or areas exhibiting wetland characteristics exist on or near the sites proposed for construction; therefore, implementation of the proposed action would have no impact on wetlands. The construction activities in the LOLA area and Area II could intersect arroyos, which could be jurisdictional waters of the U.S. While the impacts to the jurisdictional waters of the U.S. would be minimal, a Section 404 Permit and consultation with USACE would be conducted to determine the presence of jurisdictional waters of the U.S. prior to construction activities, if required.

Wildlife

Since the proposed facilities construction and modifications would occur on previously developed areas that are predominantly graded or paved, proposed construction activities would not result in measurably adverse impacts on terrestrial wildlife. An increase of about 42,162 acres would occur under the projected noise contours (i.e., above 65 DNL) with the addition of the F-35 at Nellis AFB. Wildlife species inhabiting area under noise contours associated with the base have likely habituated to aircraft noise; the proposed noise levels are not expected to adversely affect these species at Nellis AFB.

Bird/wildlife-aircraft strikes have not historically presented an operational constraint to Nellis AFB. In the course of a 14-year period, there have been a total of 233 bird-aircraft strikes within the immediate vicinity of the base involving Nellis AFB aircraft (see section 3.5/4.5, Safety). The proposed action would increase base airfield operations by 21 percent and it is likely to result in an increase in bird/wildlife-aircraft strikes. However, because the F-35 would operate like all other fighters that have used Nellis AFB and they rarely encounter bird/wildlife-aircraft strikes, then it is likely that no aspect of the proposed action would significantly increase BASH to unsafe levels.

Special-Status Species

The only special-status species found on base is the desert tortoise, listed as threatened by both the USFWS and NDOW. Surveys conducted in 1992 found a small population in the northeastern portion of Area II. A recent USFWS opinion (USFWS 2007) regarding future impacts to the desert tortoise population in Areas I, II, III and the Small Arms Range of Nellis AFB indicated any impacts would not likely jeopardize the continued existence of the desert tortoise. According to 50 CFR Section 402.16, any new Air Force action not considered in previous biological opinions that may effect the desert tortoise in Area II, would require reinitiation of consultation with the USFWS. Nellis AFB will consult with the USFWS to avoid impacts to the tortoise due to construction activities under the proposed action if such activities occur in areas not covered in the 2007 programmatic biological opinion. As with other wildlife having likely habituated to aircraft noise, the proposed noise levels are not expected to adversely impact the desert tortoise.

The Las Vegas bearpoppy and Las Vegas buckwheat, currently listed as a species of concern, are located in Areas II and III on Nellis AFB. Construction activities would avoid these species and therefore, they would not be impacted. Except in Area II, construction would not occur in areas likely to be inhabited by the chuckwalla. In Area II, surveys will be conducted prior to construction and any chuckwalla found would be relocated. The western burrowing owl is common on the base and in the areas slated for construction. To the extent possible and considering the FY03 Defense Authorization Act, Section 315; the provisions of the Migratory Bird Treaty Act will be implemented, provided such provisions do not impact the military mission. These provisions can include surveys, relocation, and limiting ground disturbing activities to non-breeding season for the owls.

Nevada Test and Training Range

Vegetation

Potential impacts to vegetation resources were evaluated for both direct and indirect effects as a result of fire; ordnance delivery, recovery, and removal; and maintenance of targets.

The use of flares and ordnance delivery may occasionally result in accidental fires which could adversely affect vegetation and wildlife habitat by removal of plant cover (short-term effect) or altering the plant community (long-term effect). Removal of vegetation can also lead to increased erosion and sedimentation that can cause long-term environmental change. The level and extent of effects on biological resources are site specific and depend on factors such as plant community type (i.e., adaptation to fire), season, and frequency of fires.

The North and South Ranges occasionally experience fires due to munitions spotting charges and a few caused by flares. However, wildfires caused by lightning make up the significant proportion of fires on NTTR. Techniques used to limit fires from spreading include fire breaks around targets, on-site fire spotting, and fire suppression crews (Air Force 1999b). A MOU exists between Nellis AFB and BLM establishing basic procedures and responsibilities for fire prevention, reporting, and fire suppression and management.

Existing operational restrictions (altitude restrictions, fire rating restrictions, flare types permitted) are greater in MOA training airspace over non-DoD land. Restrictions at NTTR set a 5,000-feet AGL minimum release altitude in MOAs (Air Force 1999b). The most prevalent procedures currently used to reduce fire risk from flares are suspension of flare use during periods of high fire risk and restricting the release altitude of flares. Suspension of flare use during high-risk periods appears to be an effective procedure to reduce fires (Air Force 1999b). Although four to five fires occur on NTTR every year, they tend to be small and contained within the target areas, which are generally devoid of vegetation or have fire breaks around them. With the existing and continued restrictions and guidelines for flare use over MOAs and restricted airspace, the potential for fire ignition is rare. Therefore, impacts to vegetation underlying MOA and restricted airspace due to flare use would not be adverse.

Under the proposed action, F-35s would use existing target areas on NTTR for ordnance delivery and training; no new roads, targets, or facilities would be built. Since flight activities do not result in any ground disturbance, habitat underlying the MOAs and restricted airspace would not be adversely impacted under the proposed action.

Wetlands

Wetlands in the North and South ranges are composed of springs, seeps, and the pools, small streams, and saturated soils they support; there is only one perennial creek found on either range. Due to the dispersed nature of these resources and the lack of any ground-disturbing activities (e.g., ordnance use) at or near any wetland area, impacts to wetlands would not be significant. Since the lands underlying the MOAs and restricted airspace would not be subjected to any substantial or different increases of ground-disturbing activities (i.e., ordnance delivery), wetlands found there would not be adversely affected by the proposed action.

Wildlife

Potential impacts to wildlife were evaluated for both direct and indirect effects as a result of fire, ordnance delivery, recovery and removal; maintenance of targets; fires; and noise. For a discussion of bird/wildlife-aircraft strike hazards see sections 3.5 and 4.5.

There is a possibility that flare use and ordnance delivery may start accidental fires. Impacts to wildlife resulting from fire would be due to habitat disturbance, similar to those described for vegetation; these impacts would be short term and would not be significant. Fires would be less likely to occur in MOAs because ordnance delivery, the predominant cause of military related fires, would not occur and flare use would be restricted.

Under the proposed action, F-35s would use existing NTTR target areas for ordnance delivery and training; no new roads, targets, or facilities would be built. Lands underlying the Desert and Reveille MOAs would not be subject to any ground-disturbing activities. Because there would be no greater ground-disturbing activities from implementation of the proposed action, no changes to existing conditions to wildlife habitat would occur.

The greatest impact to wildlife from aircraft overflights is from the visual effect of the approaching aircraft and the related noise. Most reactions by wildlife to visual stimuli occur in response to overflights below 1,000 feet AGL (Lamp 1989; Bowles 1995).

Studies on the effects of noise on wildlife have been predominantly conducted on mammals and birds. Studies on subsonic aircraft disturbances of ungulates (e.g., pronghorn, bighorn sheep, elk, and mule deer), in both laboratory and field conditions, have shown that effects of startle and elevated heart rate are transient and of short duration and suggest that the animals habituate to the sounds (Workman *et al.* 1992; Krausman *et al.* 1993, 1998; Weisenberger *et al.* 1996). Similarly, the impacts to raptors and other birds (e.g., waterfowl, grebes) from aircraft low-level flights were found to be brief and not detrimental to reproductive success (Smith *et al.* 1988; Lamp 1989; Ellis *et al.* 1991; Grubb and Bowerman 1997). Consequently, changes to the number and types of overflights are expected to result in minor impacts to wildlife or wildlife populations.

Subsonic noise levels and overflights associated with the proposed action over the entire NTTR are similar to those for baseline conditions and the negligible increase would not be perceptible. Since there is essentially no change, the proposed action would result in minor impacts to wildlife from subsonic noise.

Supersonic operations would take place within currently authorized areas of NTTR. Little to no change in supersonic noise levels and sonic booms would occur. As such, supersonic noise conditions would remain roughly identical to baseline.

Studies of the effects of supersonic noise on birds and mammals have suggested that animals tend to habituate to sonic booms and that long-term effects are not adverse. Captive and free-ranging ungulates exhibited a startle response and increased heart rates upon initial exposure to a sonic boom and decreased response with succeeding exposures suggesting habituation (Workman *et al.* 1992). In raptors, Ellis *et al.* (1991) found that peregrine and prairie falcons' responses to simulated sonic booms were often minimal and never associated with reproductive failure. Typically, birds quickly resumed normal activities within a few seconds following a sonic boom. While the falcons were noticeably alarmed by the sonic booms, the negative responses were brief and not detrimental to reproductive success during the course of the study. Sonic boom levels and frequency of occurrence are slightly higher than baseline levels, therefore, potential impacts to wildlife from sonic booms would be minimal.

Special-Status Species

No federally-listed plant species are known to occur on the ranges. Some populations of sensitive plant species or species of concern (see Appendix E) are found on the ranges, but not within existing target areas. Existing threats to populations of sensitive plant species on the ranges include ordnance delivery and the use of flares. Threats to these plant populations are minimal, since ordnance delivery activities are restricted to existing target areas, therefore, impacts to sensitive plant species found on the ranges would be limited, if any.

According to the USFWS Biological Opinion that reviewed the potential impacts to desert tortoise populations on Ranges 62, 63, and 64, "...current weapons testing and training is not likely to jeopardize the continued existence of the desert tortoise, and is not likely to destroy or adversely modify designated critical habitat." The USFWS issued a number of reasonable and prudent measures, with their implementing terms and conditions, which are designed to minimize incidental take that might otherwise result from current weapons testing and training (USFWS 1997).

The only federally-listed species occurring on the ranges that may be affected by noise is the desert tortoise. Studies on the effects of subsonic noise on desert tortoises have found impacts to be insignificant (Bowles *et al.* 1996). Subsonic noise levels associated with the proposed action are similar to those under baseline conditions and are within normally acceptable criteria. Since there is essentially no change, the proposed action would not result in increased impacts to special-status species from subsonic noise.

Supersonic flight would occur in airspace over desert tortoise populations. As with other wildlife found under MOAs, the greatest effect of military overflights on special status species is from the visual effect of the aircraft and its associated noise. Visual impacts are expected to be minimal because most South Range and MOA operations will take place at altitudes above 5,000 feet AGL, which is higher than the level accounting for most reactions by wildlife to visual stimuli (Lamp 1989; Bowles 1995).

4.10.2 No-Action Alternative

Under the no-action alternative, there would be no change to current baseline conditions. No new construction or testing and training operations would occur, therefore, adverse impacts to biological resources are anticipated under the no-action alternative.

4.11 CULTURAL RESOURCES

Procedures for assessing adverse effects to cultural resources are discussed in regulations for 36 CFR Part 800 of the NHPA. An action results in adverse effects to a cultural resource eligible to the National Register when it alters the resource characteristics that qualify it for inclusion in the register. Adverse effects are most often a result of physical destruction, damage, or alteration of a resource; alteration of the character of the surrounding environment that contributes to the resource's eligibility; introduction of visual, audible, or atmospheric intrusions out of character with the resource or its setting; and neglect of the resource resulting in its deterioration or destruction; or transfer, lease, or sale of the property. In the case of the proposed action, potential effects to cultural resources could result from ground-disturbing activities associated with construction or demolition of significant structures, from modification of significant structures, from increased noise levels and vibrations, visual intrusions from overflights, and effects from ordnance, and chaff, and flare use.

4.11.1 Proposed Action

Nellis AFB

Archaeological Resources

Construction and demolition of structures would primarily take place near the flightline in Area I. All of Nellis AFB has been surveyed for archaeological resources. Construction that is not yet sited would be placed in areas that do not contain National Register-eligible archaeological sites. One National Register-eligible archaeological resource does exist on base, but would be avoided by construction or demolition activities. If an unanticipated discovery of archaeological materials occurs during construction, then an investigation and evaluation will be conducted according to procedures in 36 CFR Part 60 and the Nellis AFB Integrated Cultural Resources Management Plan ICRMP (Air Force 2007b).

In addition to construction and demolition on base, the addition of 36 F-35 aircraft would expand the areas outside and adjacent to Nellis AFB subject to noise equal to or greater than 65 DNL by 2022. The effects of noise on archaeological resources may be related to setting. Noise that affects setting may be caused by construction and maintenance of facilities and by machinery or vehicles or by aircraft noise and overflights. To be adversely affected, the setting of a resource must be an integral part of the characteristics that qualify the resource for listing on, or eligibility for, the National Register. Because of modern development, this would not be the case for any National Register-eligible cultural resources in the area, especially in an urban setting like Las Vegas. For the same reasons, adverse visual effects to National Register-eligible archaeological resources are unlikely. Nellis AFB and adjacent areas are currently used for grazing or are developed, and contain two major highways. Additional noise is unlikely to adversely affect archaeological resources in this area or to affect the existing setting.

Architectural Resources

A potentially eligible Cold War-era structure at Nellis AFB could be affected by construction or demolition activities. Although World War II and Cold War era structures have been previously inventoried, a new assessment of Nellis AFB Cold War structures will be completed in 2008 (personal communication, Keith Myher 2008). If an infrastructure project would affect a National Register-eligible structure, then procedures in accordance with 36 CFR Part 60, as specified in the Nellis AFB ICRMP for the Section 106 process would be implemented (Air Force 2007b). Therefore, F-35 activities on Nellis AFB would not have an adverse effect on National Register-eligible architectural resources.

Studies have established that subsonic noise-related vibration damage to structures, even historic buildings, requires high decibel levels generated at close proximity to the structure and in a low frequency range (USFS 1992; Battis 1983, 1988). Aircraft must generate at least 120 dB at a distance of no more than 150 feet to potentially result in structural damage (Battis 1988). A study by Wyle Laboratories (Sutherland 1990) indicated that a large, high-speed aircraft flying directly over a building had less than a 0.3 percent chance of damaging fragile structures such as wooden buildings. In other words, an aircraft operating at 200 feet AGL, at 540 knots true airspeed, directly over such a structure is extremely unlikely to cause damage. Operations at higher elevations would have a lower potential for causing damage as on-the-ground noise levels decrease as the aircraft's elevation rises. Structures offset from the flight track have an even lower probability of being affected by low-flying aircraft. Therefore, historic structures or Cold War-era structures are also unlikely to be affected by noise and vibrations by overflights since noise levels (SEL) from the F-35 would not exceed 110 dB.

Traditional Cultural Resources

No traditional cultural properties are known to occur on Nellis AFB; therefore, impacts to this resource are unlikely.

Nevada Test and Training Range

Archaeological Resources

Ordnance delivery would take place on existing target complexes on NTTR under the proposed action. Similar ordnance is currently being used at these target areas and delivery of additional ordnance by F-35 aircraft would not increase disturbed areas near targets. F-35 use of ordnance on existing targets would be unlikely to adversely affect National Register-eligible archaeological resources.

Architectural Resources

Subsonic noise within NTTR would increase from a maximum of 63 DNL to 65 DNL (251,840 and 351,840 sortie-operations, respectively) in R-4807 under the F-16 surrogate and from a maximum of 66 DNL to 67 DNL with F-22A as a surrogate (again in a portion of R-4807). Therefore, no adverse impacts to cultural resources is expected from increased subsonic noise associated with the beddown of F-35 aircraft at Nellis AFB.

It is possible for sonic booms to adversely affect some cultural resources. Individual sonic booms vary considerably. The average boom pressure on the ground is 1 pound per square foot (psf). Maximum overpressures of even 6 psf have an extremely low potential to damage structures or displace rocks (Battis 1983). Therefore, while there is some potential for sonic booms to cause damage in historic buildings, there is very low potential for structural damage to architectural resources or for displacement and breakage of the components of most archaeological resources.

Supersonic noise levels would increase little under the proposed action. Frequency of sonic booms expected with the F-35 would also increase slightly by 1 to 2 booms per month in all airspace units except for the Elgin MOA, where it would increase 4 booms per months under 351,840 sortie-operations. Supersonic flight is currently restricted over Caliente, R-4808, and Highway 168 in the southeastern section of the Desert MOA and this restriction would remain unchanged for the proposed action. Potential effects from sonic booms include audible intrusions to traditional resources and vibration effects to historic structures and rock art sites. There is very low potential for structural damage to architectural resources due to sonic booms. Therefore, no adverse effects to architectural resources are expected due to an increase in supersonic noise levels or frequency of sonic booms.

Traditional Cultural Resources

An increase in sonic boom frequency could adversely affect traditional use or sacred areas by creating an audible intrusion to the setting; however, previous consultations have not elicited concerns. Continuing consultation with American Indian groups would continue through the Native American Program to identify areas of concern and to determine the extent of effects to these resources.

Potential effects to cultural resources from chaff are primarily related to visual impacts to resources where setting is the primary significance criteria. These resources may include rural historic landscapes or traditional or sacred areas. The effects to cultural resources from the use of flares is usually associated with the secondary effects of fire. The probability of flares causing fires is usually related to the chances of unexpended flares reaching the ground, the chances of flames igniting vegetation, and the chances of the fire spreading (Air Force 1997a). Chaff and flares would continue to be used as described in Chapter 2. This continued use would have a negligible, if any, effect on cultural resources.

4.11.2 No-Action Alternative

Under the no-action alternative, there would be no beddown of the F-35 FDE program and WS at Nellis AFB. No buildings associated with the action would be demolished, modified, or constructed. No additional target use or increased noise or sonic booms would occur. The effect on the environment would be unchanged relative to baseline. Therefore, this alternative would have no impacts to archaeological, architectural, or traditional resources.

4.12 HAZARDOUS MATERIALS AND WASTE

The qualitative and quantitative assessment of impacts from hazardous materials and waste focuses on how and to what degree the alternatives affect hazardous materials use and management, hazardous waste generation and management, and waste disposal. A substantial increase in the quantity or toxicity of hazardous substances used or generated is considered a potentially significant impact. Significant impacts could result if there would be a substantial increase in human health risk or environmental exposure at a level that could not be mitigated to acceptable levels. A reduction in the quantity and types of hazardous substances would be considered a beneficial impact. If the quantity of hazardous substances used or generated would not change, then there would be no impact.

A comparative analysis of existing and proposed hazardous materials and waste management practices was performed to evaluate impacts. The analysis considered the magnitude of anticipated increases in hazardous waste generation considering historic levels, existing management practices, and storage capacity.

Since changes associated with the proposed action in NTTR would not affect hazardous materials and waste (section 2.5), only potential impacts on Nellis AFB are discussed.

4.12.1 Proposed Action

Hazardous Materials and Hazardous Waste Generation

The hazardous materials and waste associated with the F-35 program would not significantly impact installation management programs. Management protocols for hazardous substances related to the F-35 would follow existing regulations and procedures because no new type of hazardous materials or hazardous wastes is anticipated with the aircraft beddown.

The F-35 hazardous materials program would consist of the following processes: identification and tracking, materials evaluation and materials decision, reporting and documentation, and information dissemination. The hazardous materials program would minimize the quantity and types of hazardous materials associated with the F-35. Ozone-depleting substances would be eliminated. The use of cadmium would be minimized and other substances such as volatile organic compounds, isocyanates, and chrome would be reduced. Efforts would continue to minimize the use of methyl ethyl ketone (a toxic solvent) and methylene dianiline (used in adhesives).

The most commonly used hazardous materials on the F-35 flightline would include jet and motor fuels, other types of petroleum products, paints, thinners, adhesives, cleaners, lead-acid batteries, hydraulic fluids, and halogenated and non-halogenated solvents.

Maintenance activities associated with the F-35 would include corrosion control and painting; aircraft avionics, electrical system, radar, wheel and tire repair; jet engine, fueling system, structural, and navigational/communication repairs; and aircraft washdown. Materials used during these activities would include primers, topcoats, various coatings, solvents, sealants, epoxies, solder, paint and epoxy strippers, adhesives, refrigerants, coolants, hydraulic fluids, cleaners, lubricants, and degreasers.

Other planned maintenance operations would involve minor maintenance for vehicles and equipment associated with the F-35 program. These operations would not differ from those currently performed for vehicles and equipment associated with other aircraft types at Nellis AFB. Petroleum, oil, and lubricants, would be recycled. Substances used for, or resulting from, minor maintenance activities would be stored in small quantities at each facility. Diesel fuel for support vehicles would be stored in existing aboveground storage tanks, and appropriate spill prevention and containment strategies would continue to be implemented. In addition, a spill prevention, control, and countermeasures plan would be implemented, and appropriate spill response equipment would be located on site.

Estimates show that about 70 percent of the hazardous waste generated by the F-35 would be derived from six processes: aircraft structural maintenance, AGE maintenance, in-squadron maintenance, munitions maintenance, propulsion and test cell, and supply fuels management (Table 4.12-1). Less notable contributions to overall waste generation would come from additional maintenance activities, such as avionics, tire and wheel shops, and the structural sheet metal shop. As no F-35 data are available, hazardous wastes estimates from a similar, single-engine aircraft, the F-16, were used.

Table 4.12-1 Hazardous Wastes Generated by F-16 Maintenance Processes

Maintenance Process	*Pounds per Aircraft per Year*
Corrosion Control	180
AGE	17
In-Squadron Maintenance	30
Munitions Maintenance	62
Propulsion and Test Cell	25
Supply Fuel Management	10
Total	**324**

Source: Final EA for the Proposed Force Structures Changes and Related Action at Cannon AFB, New Mexico, July 1995

While the F-16 is a similar, single-engine aircraft, it is an older airframe and newer aircraft materials and components have since been developed that contain fewer hazardous materials. Operations and maintenance procedures have also been refined to minimize hazardous materials. For example, unlike the F-16, the F-35 will not use hydrazine. It can be anticipated that the amount of hazardous waste generated by the F-35 will be less than that of the F-16. In comparison, data from all 113 Nellis assigned aircraft

(HH-60, A-10, F-15C, F-15E, F-16, F-22A) were assessed and the average hazardous waste per aircraft per year was 385 pounds.

After the full complement of 36 F-35s is in place by 2022, F-35 maintenance would generate about 11,664 pounds of RCRA hazardous waste per year (324 pounds per year x 36 aircraft). This would represent a 6 percent increase in total hazardous waste relative to current conditions. No new types of waste streams are anticipated, and this increase would not affect current hazardous waste management protocols or generator status. Nevertheless, if any new waste streams are identified after the production model of the F-35 is finalized, the appropriate transportation, storage, and disposal procedures would be developed. Through recycling and pollution prevention, hazardous waste at Nellis AFB has declined and is anticipated to continue to decline. These procedures would be applied to waste streams from the F-35 and hazardous waste is expected to decline as well.

Construction and maintenance activities associated with the proposed action would require the use of hazardous substances such as petroleum, oil, and lubricants. During construction, use of these substances for fueling and equipment maintenance would have the potential for minor spills and releases. Use of best construction practices would reduce this potential to an insignificant level.

For any personnel associated with the proposed action that may come in contact with these materials, specialized training for handling and disposal of wastes would be available. Aircraft hangars used for F-35s would be similar to the F-22A hangar which does not have floor drains, thus preventing discharges of hazardous substances into sanitary or storm sewer systems. In addition, a Stormwater Pollution Prevention Plan (Air Force 1998b) prepared by Nellis AFB personnel provides methods for the reduction or elimination of pollution in local groundwater sources, should any hazardous materials be inadvertently released.

Adherence to all requirements for hazardous materials storage and use, as well as temporary storage of hazardous wastes, would be monitored under the Air Force's Environmental Safety and Occupational Health Compliance Assessment Management Program.

Asbestos may be encountered as structures are remodeled or demolished to accommodate new F-35 support facilities. It is current Air Force practice to remove exposed friable asbestos and manage other asbestos-containing materials in place, depending on the potential threat to human health. Friable asbestos, if encountered would be removed by licensed contractors and disposed of in a local asbestos-permitted landfill.

4.12.2 No-Action Alternative

Under no-action alternative, Nellis AFB personnel would continue to use hazardous materials in the same manner and quantity as present. The types and amounts of hazardous waste generated would continue without change under this alternative. Existing procedures for the centralized management, procurement, handling, storage, issuing, and disposal of hazardous materials used on base would remain unchanged. If needed, spill prevention, control, and countermeasures plans would be updated to address any new procedures.

The no-action alternative includes no specific plans to alter or demolish asbestos-containing buildings. Normal modifications and repairs to such buildings would likely occur as at present. Any asbestos-containing materials encountered during these efforts would be handled under existing rules to reduce exposure to, and release of, friable asbestos.

5.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

5.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

5.1 CUMULATIVE EFFECTS

This section provides 1) a definition of cumulative effects, 2) a description of past, present, and reasonably foreseeable actions relevant to cumulative effects, 3) an assessment of the nature between interaction of the proposed action with other actions, and 4) an evaluation of cumulative effects potentially resulting from these interactions.

5.1.1 Definition of Cumulative Effects

CEQ regulations stipulate that the cumulative effects analysis should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR 1508.7). Recent CEQ guidance in *Considering Cumulative Effects* affirms this requirement, stating that the first steps in assessing cumulative effects involve defining the scope of the other actions and their interrelationship with the proposed action. The scope must consider other projects that coincide with the location and timetable of the proposed action and other actions. Cumulative effects analysis must also evaluate the nature of interactions among these actions.

Cumulative effects are most likely to arise when a relationship or synergism exists between a proposed action and other actions expected to occur concurrently or in a similar location. Actions overlapping with or in close proximity to the proposed action would be expected to have more potential for a relationship than those more geographically separated. Actions that coincide, even partially, in time would tend to offer a higher potential for cumulative effects.

To identify cumulative effects the analysis needs to address three fundamental questions:

1. Does a relationship exist such that elements of the proposed action might interact with elements of past, present, or reasonably foreseeable actions?
2. If one or more of the elements of the proposed action and another action could be expected to interact, would the proposed action affect or be affected by impacts of the other action?
3. If such a relationship exists, then does an assessment reveal any potentially significant impacts not identified when the proposed action is considered alone?

5.1.2 Scope of Cumulative Effects Analysis

The scope of the cumulative effects analysis involves both the geographic extent of the effects and the time frame in which the effects could be expected to occur. For this F-35 beddown EIS, two affected areas define the geographic extent of the cumulative effects analysis. The first affected area includes Nellis AFB and its vicinity, including its associated airspace. The second affected area defines the horizontal boundaries of NTTR and the vertical boundaries of its overlying airspace. Examination of other actions not occurring within or adjacent to one or both of these affected areas reveals that they lack the necessary interactions to result in cumulative effects.

The time frame for cumulative effects centers on the timing of the proposed action. For the beddown itself, the time frame extends from 2009, when construction would begin, through 2022, when the last F-35s would arrive at Nellis AFB. The effects of implementing the FDE program and WS would continue into the future beyond 2022 because new aircraft commonly remain in the inventory for 25 years or more. Actions occurring beyond the end of the beddown, other than the beddown and its operations, or the continued use of Nellis AFB and NTTR, are not reasonably foreseeable and cannot be considered under cumulative effects.

Past actions within the two affected areas relate predominantly to activities on and use of Nellis AFB and NTTR. Under the no-action alternative, the current environmental conditions of these two areas underwent analysis in this EIS. Since those conditions represent the result of long-term use occurring at Nellis AFB and in NTTR, analysis of the no-action alternative has considered those past and present effects engendered by the operation and use of the base and NTTR. The *Renewal of the Nellis Air Force Range Land Withdrawal Legislative EIS* (Air Force 1999b) for the withdrawal renewal also addressed the effects of the use of NTTR. Previous analyses addressing the Nellis AFB affected area include *Wing Infrastructure Development Outlook (WINDO) EA* (Air Force 2006d), *F-22 FDE and WS Beddown at Nellis AFB, Nevada EIS* (Air Force 1999a), and the *Base Realignment and Closure (BRAC) Environmental Assessment for Realignment of Nellis Air Force Base* (Air Force 2007c).

The FDE program and WS beddown EIS also has assessed the interactions, or synergistic effects, of individual elements of the proposed F-35 beddown under each resource (sections 4.2 through 4.12). For example, analyses considered the combined effects of construction and increased aircraft operations on the air quality within the affected region of Nellis AFB and NTTR (section 4.4).

Another factor influencing the scope of cumulative effects analysis involves identification and consideration of other actions. Beyond determining that the geographic scope and time frame for the actions interrelate with the proposed action, the analysis employs the measure of "reasonably foreseeable" to include or exclude other actions. For the purposes of this analysis, public documents prepared by federal, state, and local government agencies form the primary sources of information regarding reasonably foreseeable actions. Scoping also can provide insight into such actions, but no comment received at scoping for this EIS identified other such actions. Documents used to define other actions included notices of intent for EISs and EAs, management plans, land use plans, other NEPA studies, and economic and demographic projections.

5.1.3 Cumulative Effects of Reasonably Foreseeable Actions

Actions potentially relating to the cumulative effects for the proposed F-35 beddown could include those of the DoD, Department of Energy, Department of the Interior, and local counties. The following outlines these actions and assesses their relationship to the proposed beddown.

DoD Past, Present, and Future Actions

Nellis AFB is an active military installation that undergoes continuous change in mission and in training requirements. This process of change is consistent with the United States defense policy that the Air Force must be ready to respond to threats to American interests throughout the world. Several recent mission and training requirements have resulted in facility construction and upgrades on the NTTR.

Nellis AFB. The Air Force is implementing a Wing Infrastructure Development Outlook (WINDO) program of infrastructure improvements through 2008. The proposed action consisted of 631 WINDO projects at Nellis AFB (the majority of projects occur within the base environs), NTTR associated facilities, Creech AFB, and Tonopah Test Range that include repair, maintenance, infrastructure installation, renovation, construction, and demolition. Air Force analysis of the impacts of implementing these WINDO projects resulted in a Finding of No Significant Impact (Air Force 2006d). The WINDO EIAP will be revisited after 2008 to make adjustments to the planning process based on any changes in mission requirements or identified gaps in capabilities. These will be evaluated under EIAP and direct, indirect, and cumulative impacts addressed at that time.

The 2005 DoD Base Closure and Realignment Commission (BRAC) recommended realignment of aircraft for Nellis AFB; the base could gain up to eight fighter aircraft. This realignment began in late 2007 with the Air Force completing the EIAP in March 2007 (Air Force 2007c). On base, there will be administrative, operational, instructional, flightline, and infrastructure upgrades and construction disturbing 49 acres from 2007 to 2011. There would also be a 3 percent increase in annual airfield operations of roughly 1,400.

NTTR. In 2002, the Air Force approved construction of the military operations in urban terrain (MOUT) facility encompassing approximately 97 acres at Silver Flag Alpha Complex on Range 63A with facilities constructed at Creech AFB. Construction of the MOUT began in 2002 and is complete. In 2003, construction of a High Technology Training Complex (HTTC) encompassing 946 acres on Range 62 was approved by the Air Force (Air Force 2003b). Construction of the HTTC began in 2004 and will conclude in 2008.

In 2003, the Air Force implemented a force structure change that will add up to 48 medium- and high-altitude (MQ-1 and MQ-9) Predator unmanned aerial vehicles to the current inventory of 40 Predators at Creech AFB and add 143 personnel to Nellis AFB. Construction and infrastructure improvement projects related to the Predator force structure are complete. The Air Force prepared an EA for the *Predator Force Structure Changes at Indian Springs Air Force Auxiliary Field* in 2003. This analysis revealed minimal impacts and the Air Force adopted a Finding of No Significant Impact. In addition, a number of other actions has been analyzed previously in the *Renewal of the Nellis Air Force Range Land Withdrawal Legislative EIS* (Air Force 1999b) and when evaluated with the proposed F-35 beddown would not generate additive cumulative effects to the region.

Currently, components of the ExpeRT course occur at Silver Flag Alpha on NTTR and at nearby Creech AFB. Under the proposed action, the Air Force is increasing the number of students training by the Security Forces from an existing 2,520 students per year to 6,000 students per year at the end of the fourth phase of implementation in the winter of 2008. To support this increase, the Air Force is providing infrastructure improvements (a laundry/shower/latrine, leach field, water storage tanks, and communication, water , and power lines) to existing tent complex, MOUT training site, and other facilities; upgrade five existing small-arms training ranges; construct two academic facilities; and provide for a Convoy Combat Training route on existing road A-1—all on Silver Flag Alpha. Although training would continue and increase at both Creech AFB and Silver Flag Alpha, this action did not involve any new construction or upgrades of facilities at Creech AFB.

Under the BRAC realignment (2007), sortie-operations increase, as well as a minor uptake in use of munitions, chaff, and flares; no infrastructure, facilities, or ranges would need to be constructed, demolished, or renovated. Again, the total amount of activity (less than 1 percent of existing levels) is minimal in context with overall NTTR use.

DOE Past, Present, and Future Actions

No DOE actions will incrementally impact Nellis AFB and vicinity; however, lands underlying portions of NTTR airspace could be cumulatively impacted.

NTTR. In 2002, DOE completed an EIS for the Yucca Mountain repository located in Nye County. President Bush considered the Yucca Mountain site qualified for application to the Nuclear Regulatory Commission (NRC) for construction authorization and recommended the site to Congress. Subsequently, on July 23, 2002, the President signed into law (P.L. 107-200), a joint resolution of the House of Representatives and the Senate designating the Yucca Mountain site for development as a geologic repository for disposal of spent nuclear fuel and high-level radioactive waste. The DOE is preparing a license application for submission to the NRC. DOE has announced that, subject to NRC issuance of a construction authorization, construction could be completed and operations could commence by 2017. In its EIS, DOE evaluated the likelihood of an accidental crash of aircraft (military and commercial) into the surface aging facility (an above-ground storage area). DOE is updating these evaluations for the license application and will continue to coordinate with the Air Force regarding these evaluations.

Although these DOE actions occur on lands underlying DOE restricted airspace (R-4808N) jointly used by aircraft operating in the NTTR, they do not impact the proposed use of that airspace. Decisions concerning the NTS and Yucca Mountain would not influence decisions regarding Air Force operations within this airspace unit. Furthermore, use of the overlying airspace by Air Force aircraft would not contribute to the impacts of the activities at the NTS or Yucca Mountain. For these reasons, the DOE activities lack a demonstrable cumulative interaction with the F-35 proposed beddown action and are not included in the cumulative impacts analysis.

Department of Interior Past, Present, and Future Actions

BLM. The BLM manages millions of acres of public lands in southern Nevada which include portions of land underlying NTTR and areas near Nellis AFB. Management of the multiple-use public lands requires continued updating and changes to area resource management plans to maintain land use flexibility while protecting sensitive species. The F-35 proposal would be a continuation of the military mission and would not affect BLM land management in areas in the vicinity of the base or underlying NTTR airspace. Therefore, cumulative impacts would not change from existing conditions or environmental consequences presented in this EIS.

USFWS. Aircraft operate in airspace overlying the DNWR and employ ordnance within DNWR lands approved for such activity in accordance with a Letter of Agreement between the Air Force and the USFWS. Beddown of the F-35s and their use of NTTR airspace would not change the nature of overflights that the DNWR currently experiences or negligibly increase the use of the ranges within DNWR boundaries. Cumulative impacts; therefore, would not change from the existing conditions or environmental consequences presented in this EIS.

Local Actions

Nellis AFB, North Las Vegas, and a portion of NTTR lie within Clark County, whereas the majority of NTTR resides mostly in Nye and Lincoln counties. Census data and other information indicate that Clark County exhibited the greatest growth in population within the United States over the last 15 years. From 1990 through 2005, the population increased approximately 128 percent. To accommodate this growth there has been an increase in home construction, transportation network upgrades, as well as airport expansion. It is anticipated that home construction will continue throughout the Las Vegas Valley; that the highway network will continue to grow and be upgraded; and that air service will be expanded. To accommodate the growth, the FAA and BLM announced its intent to construct and operate a new supplemental commercial service airport 30 miles south of Las Vegas (the Ivanpah Valley Airport), along I-15, to alleviate congestion and delays at McCarran International Airport (SNSA 2007). While still in the impact analysis process, the potential increase and/or change in airspace use could cumulatively impact NTTR airspace.

5.2 ASSESSMENT OF CUMULATIVE EFFECTS BY RESOURCE AREA

Analysis of the F-35 proposed action, when considered cumulatively with past, present, and/or future actions, resulted in a finding of no adverse and/or significant impacts to noise; safety; land use and recreation; socioeconomics and infrastructure; environmental justice and protection of children; biological resources; and hazardous materials and waste:

- *Noise.* The additional sorties at Nellis AFB and NTTR from the BRAC action would constitute a 3 percent and less than 1 percent increase in the airfields and airspace, respectively. This increase would not change noise levels as presented in section 3.4. No other actions by the DOE, Department of Interior, or local entities would change the noise environment at Nellis AFB or NTTR as presented in section 4.4. The proposed new Las Vegas area airport is more than 30 miles south of the base and would not impact noise levels around the base or in NTTR airspace.

- *Safety.* None of the other actions would change safety procedures within the base or on NTTR lands or vice versa. DOE and Air Force safety procedures are already prescribed through existing operating agreements; no new operating safety procedures would be required under the F-35 beddown proposal, therefore, no BLM or USFWS safety regulations or procedures would be impacted by Air Force activities at Nellis AFB or NTTR.

- *Land use and recreation.* Land use impacts should not differ from those presented in section 4.6. The increase in noise levels due to the F-35 beddown could impact land uses but this level of impact would not differ when considered cumulatively with the other actions. This would also be true in lands underlying NTTR airspace. There would be an increase in subsonic and supersonic noise levels but no further increase to these noise levels are anticipated when considered with the other actions.

- *Socioeconomics and infrastructure.* When considered cumulatively, the F-35 socioeconomic impacts would be negligible when compared to impacts associated with the growth that Las Vegas Valley is currently experiencing. Input to the economy will continue to increase but would not be adverse when considered with the F-35 action. This would be the same for infrastructure impacts. Those proposed by the F-35 beddown are overshadowed by the road, public services, and utility upgrades and construction associated with the Las Vegas urban area population growth and would not incur adverse impacts when considered incrementally with these other actions.

- *Environmental justice and protection of children.* Impacts would not differ for minority or low-income populations than what are presented in section 4.7 of this EIS. No other projects, when considered cumulatively, would disproportionately impact these populations (as well as the potential risk to children) around Nellis AFB or under NTTR airspace. No adverse incremental impacts anticipated.
- *Biological resources.* Impacts to biological resources in the vicinity of Nellis AFB and NTTR would not differ noticeably from those presented in section 4.10. For the most part, developed land within Nellis AFB would be disturbed and would not adversely impact threatened and/or endangered species or habitat supporting these species. Therefore, it is not anticipated that when considered cumulatively with the other actions, biological resources would be adversely impacted. The same can be said for biological resources associated with NTTR. Other projects proposed at the DOE and the Department of Interior levels are coordinated through consultation processes already in place with the Air Force; therefore, no impacts are anticipated when considered cumulatively to biological resources.

- *Hazardous materials and waste.* No new hazardous materials would be used or introduced into the waste stream at Nellis AFB under the F-35 proposal to create adverse impacts; nor would the other on-base actions incrementally create adverse impacts to hazmat and hazardous waste. None of the other actions outside installation boundaries, in summary, would change this situation on NTTR.

Following evaluation of the F-35 proposed action and other actions cumulatively, resulted in a finding of potential effects on airspace and aircraft operations; air quality; soils and water; and cultural resources, and are presented below.

Airspace and Aircraft Operations. The proposed action would increase the number of aircraft operations at Nellis AFB and within NTTR airspace; however, operations would remain within the historical range for both the airfield and NTTR. Development of the Ivanpah Valley Airport would expand operations in the Las Vegas terminal airspace but should not have an adverse effect on airspace and aircraft operations at Nellis AFB or NTTR due to both the ongoing consultation process associated with the supplemental airport proposal as well as following existing rules and regulations of the FAA and Air Force. Programs, policies, procedures, and manuals are already in place to ensure safe airfield operations and flight safety.

The FAA has designated Nellis AFB as Class B airspace that requires all aircraft operating within the lateral and vertical limits of this area to be in communication with and under the positive control of an air traffic control facility to maximize the safe, orderly flow of all aircraft operating within this congested area. In NTTR, FAA airspace designations allow the Air Force full control to ensure the safe operation of military, commercial, and civilian air traffic within these airspace units. In summary, the potential air operations and flight safety impacts are not expected to be significant when considered cumulatively with the other actions. This would be assured by following established Nellis AFB and NTTR operating procedures, conducting all flight operations in compliance with existing regulations and restrictions, and through continued coordination between the FAA and Air Force regarding operations within these airspace units.

Air Quality. The air quality environment for Nellis AFB is the Las Vegas Valley, and Las Vegas is in nonattainment status CO (serious), PM_{10} (serious), and 8-hour ozone (basic). The F-35 proposed action will require facility construction and additional airfield operations that would increase emissions to the regional area and these impacts are presented in section 4.3. The F-35 proposed action exceeds *de minimis* thresholds for CO and the ozone precursor pollutants NO_x in 2022. This could impact regional air quality and other actions in the local area and population growth. The Air Force is coordinating with Clark County to include the 185 tons of NO_x emissions into their Ozone SIP Revision. Clark County has responded positively to this request (see Appendix D for letter) as for CO emissions, the county has already accounted for those CO exceedences in their CO SIP Revision. Clark County will continue to regulate air quality to ensure that emissions in do not exceed their budgeted levels and will continue to do so into the foreseeable future. Therefore, it is anticipated that while overall regional emissions would increase on a cumulative basis, the proportion added by the F-35 beddown would not adversely impact Clark County regional air quality.

Soils and Water. Soil impacts include soil loss and erosion. Several factors indicate that erosion and soil loss would be negligible on Nellis AFB: precipitation in the Nellis AFB/Las Vegas area is low, construction would take place over a an 8-year period, most construction would occur on previously developed land, and Air Force and Clark County require employment of standard construction practices to minimize erosion and stormwater run-off. Overall, the proposed action would result in no potential for incremental adverse impacts from proposed F-35 activities and no adverse impacts to soils when considered incrementally with other on-base actions.

In terms of water use, Nellis AFB is currently allotted about 7.1 million gpd of combined surface and groundwater sources, and full implementation of the proposed action in 2022 would result in use of approximately 355,180 gpd to 446,419 gpd, which is well within Nellis AFB's water allocation when considered with other on-base actions there would not be a negligible increase in water use to require the base to increase their existing water rights. It is unlikely, therefore, that the cumulative effects of the proposed action would have significant adverse effect on water resources at Nellis AFB and in the surrounding area. Soils and water resources within NTTR would not be impacted because no construction or operational ground disturbance activities would occur in the ranges under the F-35 beddown; therefore, no impacts would occur cumulatively when considered with other actions.

Cultural Resources. Potential effects to cultural resources could result from ground-disturbing activities associated with construction or demolition of significant structures, from modification of significant structures, from increased noise levels and vibrations, visual intrusions from overflights, and effects from ordnance, chaff, and flare use. All of Nellis AFB has been surveyed for archeological resources. Only one National Register-eligible archaeological site, a quarry, exists on base. All other sites were determined through SHPO consultation to be ineligible for nomination. If an unanticipated discovery of archaeological material occurs during construction, then an investigation and evaluation would be required and conducted according to procedures in 36 CFR Part 60 and the Nellis AFB ICRMP (Air Force 2007b). In addition, no National-Register eligible architectural resources would be affected by this proposed action and as a result of Air Force efforts to address cultural and Native American laws, no traditional cultural properties have been identified on Nellis AFB and therefore would not be impacted. A cultural resource setting may be impacted by maintenance activities, machinery and vehicle use, or by aircraft overflights. To be adversely affected, the setting of a resource must be an integral part of the characteristics that qualify the resource for listing on, or eligibility for, the National Register. Because of modern development on and around the base, neither the setting nor visual aspect would be affected by the proposed action on Nellis AFB. Additional noise, also, is unlikely to adversely impact resources at the base. Nellis AFB cultural resources, therefore, would not be adversely impacted when considered in conjunction with other on-base actions.

On NTTR, no potentially-eligible or eligible archaeological sites or architectural structures would be cumulatively affected because no new construction, demolition, or upgrade activities would occur due to the F-35 proposal. Ordnance delivery by the F-35 would occur on existing target complexes on NTTR, with similar ordnance to that currently being used at these target areas. No new disturbance areas or change of ordnance are projected when considered with other actions. Use of ordnance on existing targets would be unlikely to adversely affect National Register-eligible archaeological resources.

In the overlying NTTR airspace, impacts from overflights would require high decibel levels, generated at close proximity to the structure, and in a low frequency range to create noise-related vibration damage to structures, even historic buildings (USFS 1992; Battis 1983, 1988). Aircraft must generate at least 120 dB at a distance of no more than 150 feet to potentially result in structural damage (Battis 1988). Even a direct overflight of a fragile structure by a large, high-speed aircraft has less than a 0.3 percent chance of damage (Sutherland 1990). Operations at higher elevations have an even lower probability of being affected by aircraft overflights. Historic structures are unlikely; therefore, to be adversely affected by noise and vibrations by overflights since subsonic noise levels (SEL) from the F-35 would not exceed 110 dB and would not perceptibly increase when considered with other projects that would occur in NTTR airspace.

Frequency of sonic booms expected with the F-35 would increase booms per month in some airspace units and their impact to cultural resources is presented in section 4.12. The characterization of these impacts would not change when considered cumulatively with other actions in NTTR airspace. An increase in sonic boom frequency could adversely affect traditional uses or sacred areas by creating an audible intrusion to the setting, as could chaff use impair visual aspects; however, government-to-government consultations have not elicited concerns. The effects to cultural resources from the use of flares is usually associated with the secondary effects of fire, and to date, have little, if any impact on cultural resources. Continued chaff and flare use would have a negligible cumulative effect on cultural resources. Consultation with American Indian groups would continue through the Native American Program to identify areas of concern and to determine the extent of effects to these resources.

In summary, no adverse impacts to cultural or traditional resources are anticipated with NTTR when considered cumulatively with other actions within the same area.

5.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

NEPA requires that environmental analysis include identification of "...any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented." Irreversible and irretrievable resource commitments are related to the use of nonrenewable resource and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species or the disturbance of a cultural site).

For the proposed action, most resource commitments are neither irreversible nor irretrievable. Most impacts are short-term and temporary, or longer lasting but negligible. Those limited resources that may involve a possible irreversible or irretrievable commitment under the proposed action are discussed below.

Facilities construction and maintenance for F-35 support would require consumption of limited quantities of aggregate, steel, concrete, petroleum, oil, and lubricants. Construction would occur on previously disturbed areas or locations lacking native habitat, so no irreversible loss of habitat and wildlife would result. Similarly, construction on base would avoid significant cultural resources. While construction of new facilities would incur some soil disturbance and loss, measures to localize and minimize soil loss would be implemented.

The proposed F-35 beddown would require fuels used by aircraft and surface vehicles. The additional sorties from Nellis AFB would result in fuel use for as long as the F-35 FDE program and WS continued. Surface vehicles supporting F-35 maintenance and operations would also use fuel, oil, and lubricants. However, since the mandated FDE program and WS would need to occur at some location, use of these finite resources would be inevitable.

Personal vehicle use by the staff proposed to support the F-35 beddown would consume fuel, oil, and lubricants. The amount of these materials would not perceptibly change from that currently used by these individuals and their families at Nellis AFB and would not increase overall consumption of these resources. Ordnance use would cause negligible ground disturbance, soil exposure, and erosion. Existing targets will be used for F-35 training so new disturbance would be likely. In addition, quantities of steel and other materials used in construction of munitions and targets would be committed under the proposed action.

6.0 REFERENCES CITED

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9.0 LIST OF REPOSITORIES

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Repository	*Address*	*City*	*State*	*Zip*	*Phone*
Alamo Branch Library	100 North 1st Street	Alamo	NV	89001	775-725-3343
Beatty Library District	400 North 4th Street	Beatty	NV	89003	775-553-2257
Boulder City Library	701 Adams Blvd	Boulder City	NV	89005	702-293-1281
Caliente Branch Library	100 Depot Avenue	Caliente	NV	89008	775-726-3104
Nevada State Library and Archives Federal Publications	100 N. Stewart Street	Carson City	NV	89701	775-684-3360
James Dickinson Library	4505 Maryland Parkway	Las Vegas	NV	89154	702-895-3011
Las Vegas Library, Reference Department	833 Las Vegas Blvd North	Las Vegas	NV	89101	702-507-3500
North Las Vegas Library District Main Branch	2300 Civic Center Drive	North Las Vegas	NV	89030	702-633-1070
Pahrump Community Library	701 East Street	Pahrump	NV	89048	775-727-5930
Community College of Southern Nevada Library - Cheyenne Campus	3200 E Cheyenne Ave	North Las Vegas	NV	89030	702-651-4000
Business and Government Info. Center/322 - University of Nevada Libraries	1664 N. Virginia Street	Reno	NV	89557	775-784-6945, ext 230
Tonopah Public Library	171 Central	Tonopah	NV	89049	775-482-3374
Lincoln County Library	15 Main Street	Pioche	NV	89043	775-463-6645

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APPENDIX A
PUBLIC PARTICIPATION AND CONSULTATION SUMMARY

APPENDIX A
PUBLIC PARTICIPATION AND CONSULTATION

1.0 INTRODUCTION

This appendix presents a summary of the public participation efforts for implementation of the F-35 Force FDE program and WS beddown at Nellis AFB, NV. Many opportunities have been and will be available for public participation in the F-35 FDE program and WS beddown EIAP. These include the following:

- scoping sessions and comment period;
- agency notification and consultation; and
- public hearings and comment period.

2.0 SCOPING PROCESS

The scoping period for the F-35 FDE program and WS beddown EIAP began when the Notice of Intent was published in the *Federal Register* on August 23, 2004 (Attachment A). The closing date for the scoping period was set for October 1, 2004. Although the receipt of public comments is most useful during the early stage of the EIAP, the Air Force stated during the scoping sessions that they would welcome comments throughout the EIS analysis and preparation process.

The Air Force's intent during the scoping process was to provide the greatest level of opportunity for government agencies, special interest groups, and the general public to learn about the beddown proposal and to offer several ways for those interested to express their concerns regarding the proposal. Newspaper advertisements (Attachment B) were placed a week before the meetings (in both English and Spanish) in the following newspapers: *Las Vegas Review Journal, Las Vegas Sun, Nevada Appeal, Lincoln County Record, Pahrump Valley Times,* and *El Mundo* (a Spanish publication) describing the proposal and alternatives. The advertisement provided the time, dates, and locations of the meetings. Public comment was invited in these advertisements as well as at the scoping meetings. Public service announcements for the meetings were made on National Public Radio and aired on local Las Vegas television stations.

These scoping meetings were conducted in an "open house" format to create a comfortable atmosphere for attendees—one in which they could converse individually with Air Force personnel. Attendees were welcomed at the entrance by Air Force representatives. The greeters asked attendees to sign in, distributed factsheets, and directed them to the first display. The NEPA factsheet (Attachment C) was printed in both English and Spanish. Displays were designed to enhance public understanding of the NEPA process and the multi-role F-35, the purpose and need for the proposed action, and the public's role in shaping the proposal.

Attendees were encouraged to examine these displays and to ask any questions they had regarding the information presented. The displays illustrated information regarding the construction, personnel, and flight activities proposed at Nellis AFB and on the number and location of F-35 flight operations proposed for the NTTR. Air Force personnel and AFCEE representatives encouraged attendees to examine the displays and ask questions. They were also encouraged to formulate and submit scoping comments.

The Air Force held five scoping meetings at locations in Nevada that could potentially be affected by the proposed action and in communities that have expressed concerns with NTTR activities. All meetings were held from 6:00 p.m. to 8:00 p.m.; the schedule and location of each meeting is provided in the table below.

Schedule of Meetings, Attendance, and Comments

City/Town	*Date*	*Location*	*Attendees*	*Comments*
Carson City	Monday, September 13	Plaza Hotel 801 S. Carson Street	4	0
Alamo	Tuesday, September 14	Lincoln County Annex 100 South First West Street	15	3
Pioche	Wednesday, September 15	Pioche Town Hall Hinman and Main Streets	4	1
Pahrump	Thursday, September 16	Bob Ruud Community Center 150 N. Highway 160 – Room B	4	0
Las Vegas	Friday, September 17	Hollywood Recreation Center 1650 S. Hollywood	13	5

During the official scoping period ten total comment sheets or letters were received. Nine sheets (with several comments on each) at the scoping meetings and a letter from the Nevada State Clearinghouse with comments from the SHPO and Nevada Department of Wildlife. The SHPO indicated that once specific information is known about flight patterns and construction, it should be notified so that it can determine the potential for adverse impacts to religious, cultural, and historic properties. The Department of Wildlife expressed concern for: 1) sensitive mesquite/acacia plant communities that support a Neotropical migrating bird (*Phainopepla nitens*); 2) burrowing owls; and 3) kit fox (a state-protected species).

Three comment sheets addressed the concern with sonic booms—the number, severity, potential for structure (i.e., window) damage, and human disturbance. In Carson City, two attendees verbally (i.e., no written comments were received) expressed a concern for potential low-altitude flight conflicts over areas being considered for wind generation development under NTTR airspace. One commentor in Pioche observed that early morning flights, in airspace over the central portion of NTTR, during the fall hunting season appeared to scare deer. In Alamo, one commentor asked if a restricted area could be created over the town.

Three commentors in Las Vegas stated their appreciation for the Air Force; one commentor asked how the current noise will compare with the new F-35 (taxi, take-off, and landing) and asked if the F-35s will be used in the same way at the range (e.g., flights per day, how low, how fast). Another commentor expressed the following concerns: 1) noise, 2) radar interference, 3) safety (suggested creating a buffer zone around the residential area to the east), and 4) EPA results.

With the exception of Pahrump, media representatives were present at all meetings and in Las Vegas, Channel 3 (NBC affiliate) sent a reporter and cameraman to interview Air Force representatives and members of the public.

3.0 INTERAGENCY-INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING (IICEP)

As part of the EIAP, consultation and correspondence was performed with several state and federal agencies. That correspondence included the following:

U.S. Fish and Wildlife Service (USFWS):

Memorandum from HQ ACC/CEPP to USFWS, State Supervisor, Reno Office, August 12, 2004

Nevada Department of Wildlife (NDOW)

Memorandum from HQ ACC/CEVP to NDOW, Reno Headquarters, August 12, 2004

Nevada State Historic Preservation Officer (SHPO)

Memorandum from HQ ACC/CEVP to SHPO, August 12, 2004

Native American Interaction Program

Memorandum from Nellis AFB on August 12, 2004, to:

- Moapa Band of Paiutes
- Timbisha Shoshone Tribe
- Duckwater Shoshone Tribe
- Big Pine Paiute Tribe of the Owens Valley
- Kaibab Band of Southern Paiutes
- Fort Mojave Tribe
- Pahrump Paiute Tribe
- Yomba Shoshone Tribe
- Colorado River Indian Tribes
- Las Vegas Paiute Tribe
- Lone Pine Paiute Shoshone Tribe
- Las Vegas Indian Center

Timbisha Shoshone Tribe
Ely Shoshone Indian Tribe
Benton Paiute Indian Tribe
Chemehuevi Indian Tribe
Paiute Indian Tribes of Utah
Bishop Paiute Indian Tribe
Fort Independence Indian Tribe

Copies of the correspondence are presented at the end of this appendix (Attachment D).

4.0 PUBLIC HEARINGS AND COMMENTS

The public comment period for the F-35 FDE program and WS beddown Draft EIS began when the Notice of Availability is published in the *Federal Register* on April 4, 2008. The public comment period will extend for 45 days from that date.

Advertisements announcing the hearings will be placed in the same local newspapers used to announce the scoping meetings (see above). Public service announcements will be aired on regional radio stations. The proposed format for the public hearings will combine the formal hearing approach with the open house format. Prior to formal public testimony, a brief summary of the environmental process and the F-35 FDE program and WS beddown proposal and EIS analysis will be presented by Air Force personnel. In addition, displays will be staffed by Air Force personnel to answer any questions the public may have regarding the analysis presented in the EIS.

Public hearing attendees will again be greeted by Air Force representatives at the door where the registration table will be located. Attendees will be asked to write their name and address on the registration sheet. If they choose to testify, they will be asked to complete a speaker card with this same information. They will also be offered fact sheets and any other relevant written materials describing the F-35 beddown proposal and EIS analysis. Two methods of commenting will be available for people attending the public hearings:

1. oral comments recorded by a court reporter and/or
2. written comments, either brought with them or completing a comment form provided by the Air Force.

The Air Force plans to hold hearings in three locations: Las Vegas, Caliente, and Alamo, NV.

ATTACHMENT A

Notice of Intent

DEPARTMENT OF DEFENSE
Department of the Air Force

NOTICE OF INTENT TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT FOR F-35 FORCE DEVELOPMENT EVALUATION AND WEAPONS SCHOOL PERMANENT BEDDOWN AT NELLIS AFB, NEVADA

AGENCY: Air Combat Command, United States Air Force.

ACTION: Notice of intent.

SUMMARY: Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321, et seq.), the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), and Air Force policy and procedures (32 CFR Part 989), the Air Force is issuing this notice to advise the public of its intent to prepare an Environmental Impact Statement (EIS) to assess the potential environmental impacts of stationing F-35 tactical fighter aircraft at Nellis Air Force Base (AFB), Nevada.

A total of 36 F-35 aircraft would be permanently based at Nellis AFB in support of the Force Development Evaluation (FDE) mission and the United States Air Force Weapons School (USAFWS). The FDE mission is to test and evaluate state-of-the-art weapons systems and develop leading-edge tactics to improve the future combat capability of Air Force aerospace forces. The USAFWS mission is to teach graduate-level instructor courses, which provide advanced training in weapons and tactics employment to officers of the combat air forces. The beddown would occur in phases between the years 2009 and 2028. The proposed action would also include facility construction on Nellis AFB to be accomplished over a 3-year period, beginning in fiscal year 2007. The Air Force will consider all environmental issues supporting the beddown, however, the Air Force has currently identified air quality and noise as issues requiring detailed analysis.

The Air Force will host a series of scoping meetings to receive public input on alternatives, concerns, and issues to be addressed in the EIS. The schedule and locations of the scoping meetings are as follows:

Monday, September 13, 2004	Carson City Plaza Hotel 801 S. Carson Street
Tuesday, September 14, 2004	Alamo Lincoln County Annex 100 South First West Street
Wednesday, September 15, 2004	Pioche Pioche Town Hall Hinman and Main Streets
Thursday, September 16, 2004	Pahrump Bob Ruud Community Center

150 N. Highway 160 - Room B

Friday, September 17, 2004

Las Vegas
Hollywood Recreation Center
1650 S. Hollywood

The Air Force will accept comments at any time during the environmental analysis process. However, to ensure the Air Force has sufficient time to consider public input in the preparation of the Draft EIS, comments should be submitted to the address below by 1 Oct, 2004.

POINT OF CONTACT: Ms. Sheryl Parker, HQ ACC/CEVP, 129 Andrews St., Suite 102, Langley AFB, VA 23665-2769, (757-764-9334).

NEWS RELEASE

UNITED STATES AIR FORCE

Air Warfare Center Public Affairs
4370 N. Washington Blvd. Suite 223
Nellis AFB, NV 89191-7078
Phone: (702) 652-2750; Fax (702) 652-9838
E-mail: michael.estrada@nellis.af.mil

www.nellis.af.mil/pa/newsreleases.htm

Release No. 04-24
Time: 8 a.m.
Date: Aug. 23, 2004

AIR FORCE ISSUES NOTICE OF INTENT ON THE F-35 FORCE DEVELOPMENT EVALUATION AND WEAPONS SCHOOL PROGRAMS AT NELLIS AFB

NELLIS AIR FORCE BASE, Nev. -- The Air Force published today the Notice of Intent in the Federal Register to prepare an environmental impact statement to assess the potential environmental impacts of a proposal to permanently base F-35 aircraft here for the Force Development Evaluation and Weapons School mission.

The F-35 Joint Strike Fighter is designed to complement the F/A-22 and would replace the aging F-16 and A-10 fleets. The first aircraft delivery is scheduled in 2009. The proposal is to base a total of 36 operational aircraft at Nellis by 2028.

The Air Force expects to complete the environmental analysis process in about two years. The environmental impact analysis will examine the issues relating to land use, airspace and safety, air and water quality, noise, socioeconomics, biological and cultural resources, and cumulative actions.

The Air Force will conduct the scoping meetings in mid September at:

--more--

Air Force to hold public scoping meetings on F-35 Force Development Evaluation and Weapons School programs at Nellis AFB

NELLIS AIR FORCE BASE, Nev. -- The Air Force has scheduled a series of public meetings to gather feedback from the public on the environmental process which will help establish a home for the F-35 Force Development Evaluation and Weapons School programs. Public feedback gathered from these meetings will assist the Air Force in defining the scope of analysis in the environmental impact statement.

The scoping period includes scoping meetings at five locations in Nevada to solicit community involvement and feedback for the environmental analysis to support the permanent basing of the F-35 Joint Strike Fighter at Nellis Air Force Base.

The F-35 is the next generation, stealth air-to-ground fighter, designed to complement the F/A-22 and replace the aging F-16 and A-10 fleets. The first aircraft delivery is scheduled in 2009. The proposal is to base a total of 36 operational aircraft at Nellis by 2028. Drawdown of the F-16 and A-10 aircraft at Nellis would begin in 2019.

Public involvement is an essential part of the environmental impact analysis process. With public involvement and detailed environmental analysis, the National Environmental Policy Act process helps the decisionmaker arrive at the best possible informed decision.

The open house scoping meetings will be held from 6:00 p.m. – 8:00 p.m. Air Force representatives will be available to provide information on the proposed action and answer questions and receive comments on the proposal. The schedule for the public scoping meetings is:

-- Carson City, Nev.: Monday, September 13, Plaza Hotel, 801 S. Carson Street

-- Alamo, Nev.: Tuesday, September 14, Lincoln County Annex Building, 100 South First West St.

-- Pioche, Nev.: Wednesday, September 15, Pioche Town Hall, Hinman & Main Streets

-- Pahrump, Nev.: Thursday, September 16, Bob Rudd Community Center, 150 N. Highway 160

-- Las Vegas, Nev.: Friday, September 17, Hollywood Community Center, 1650 S. Hollywood

The environmental impact analysis process will examine issues relating to land use, airspace and safety, air and water quality, noise, socioeconomics, biological and cultural resources, and cumulative actions. The environmental analysis process will be completed in about two years.

-- Carson City, Nev.: Monday, September 13, Plaza Hotel, 801 S. Carson Street

-- Alamo, Nev.: Tuesday, September 14, Lincoln County Annex Building, 100 South First West St.

-- Pioche, Nev.: Wednesday, September 15, Pioche Town Hall, Hinman & Main Streets

-- Pahrump, Nev.: Thursday, September 16, Bob Rudd Community Center, 150 N. Highway 160

-- Las Vegas, Nev.: Friday, September 17, Hollywood Community Center, 1650 S. Hollywood

Comments will be accepted throughout the environmental impact analysis process; however, to ensure sufficient time to consider public and agency comment in preparation of the draft environmental impact statement, comments should be submitted to the address below by Oct. 1, 2004.

AWFC/PA

4370 N. Washington Blvd., Suite 223

Nellis AFB, NV 89191-7078

Attn: Mike Estrada

For more information, contact Mike Estrada at (702) 652-2750.

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The environmental impact analysis process encourages comments and feedback at any time. However, to ensure sufficient time to consider public and agency comments in the screening process and the preparation of the draft EIS, comments should be submitted by October 1, 2004, to:

AWFC/PA
4370 N. Washington Blvd., Suite 223
Nellis AFB, NV 89191-7078
Attn: Mike Estrada

For more information, contact Mike Estrada at (702) 652-2753.

ATTACHMENT B

Newspaper Advertisements

The ***U.S. Air Force*** announces its intent to prepare an Environmental Impact Statement (EIS) to assess the potential environmental impacts of a proposal to base F-35 Fighter Aircraft at Nellis AFB, NV. A total of 36 F-35 aircraft would be permanently based in phases at Nellis AFB between the years 2009 and 2028. The Air Force will consider the information in the EIS in making the beddown decision and document it in the Record of Decision.

The ***Air Force is holding public scoping meetings*** at the locations below and invites your participation. All meetings will be held in an open house format, and your participation will assist Air Force representatives identify public issues and concerns associated with the F-35 beddown and define the scope of analysis for the EIS. During the open house, the Air Force will be available to describe the proposed action and no-action alternative, define the process involved in preparing the EIS, outline the opportunities for public involvement in the process, and answer questions relevant to the proposal you might have. All **open house meetings will begin at 6:00 p.m. and last until 8:00 p.m**. The open house will be held at the following locations:

City/Town	***Date***	***Location***
Carson City	Monday, September 13	Plaza Hotel, 801 S. Carson Street
Alamo	Tuesday, September 14	Lincoln County Annex, 100 South First West Street
Pioche	Wednesday, September 15	Pioche Town Hall, Hinman and Main Streets
Pahrump	Thursday, September 16	Bob Rudd Community Center, 150 N. Highway 160
Las Vegas	Friday, September 17	Hollywood Recreation Center, 1650 S. Hollywood

If you are unable to attend one of these open house meetings, you may submit written comments to:

Mike Estrada, Air Warfare Center/Public Affairs Office (AWFC/PA)
4370 N. Washington Blvd., Suite 223, Nellis AFB, NV 89191
For general information, contact Mr. Estrada at: (702) 652-6448

Although we will accept comments throughout the process, we recommend that your scoping comments be sent by October 1, 2004, to ensure equitable consideration in the draft EIS.

La ***Fuerza Aérea de los Estados Unidos*** anuncia su intención de preparar una Declaración de Impacto Ambiental (EIS en inglés) para evaluar los impactos ambientales potenciales de una propuesta para instalar una base de aviones de combate F-35 en Nellis AFB, NV. Un total de 36 aviones F-35 se instalarían de forma permanente y por etapas entre los años 2009 y 2028. La Fuerza Aérea considerará la información en la EIS para tomar una decisión y la documentará en el Registro de Decisiones.

La ***Fuerza Aérea estará celebrando reuniones públicas de alcance*** en los lugares que se indican a continuación y le invita a participar. Todas las reuniones se harán a puertas abiertas y su participación ayudará a los representantes de la Fuerza Aérea a identificar los temas e inquietudes del público asociados con el asentamiento de los aviones F-35, y definir el alcance del análisis de la EIS. Durante las reuniones, la Fuerza Aérea estará disponible para describir la acción propuesta y la alternativa de no-acción, definir el proceso implicado en la preparación de la EIS, esbozar las oportunidades para que el público se involucre en el proceso y responder a las preguntas relacionadas con la propuesta que pueda tener. Todas las **reuniones a puertas abiertas comenzarán a las 6:00 p.m. y se prolongarán hasta las 8:00 p.m.** Las reuniones se celebrarán en las siguientes ubicaciones:

Ciudad/Población	***Fecha***	***Ubicación***
Carson City	Lunes 13 de septiembre	Plaza Hotel, 801 S. Carson Street
Alamo	Martes 14 de septiembre	Lincoln County Annex, 100 South First West Street
Pioche	Miércoles 15 de septiembre	Pioche Town Hall, Hinman y Main Streets
Pahrump	Jueves 16 de septiembre	Bob Rudd Community Center, 150 N. Highway 160
Las Vegas	Viernes 17 de septiembre	Hollywood Recreation Center, 1650 S. Hollywood

Si no le es posible asistir a una de estas reuniones a puertas abiertas, usted podrá enviar sus comentarios por escrito a:

Mike Estrada, Air Warfare Center/Public Affairs Office (AWFC/PA)
4370 N. Washington Blvd., Suite 223, Nellis AFB, NV 89191
Para información general, comuníquese con el Sr. Estrada al: (702) 652-6448

Aunque aceptaremos comentarios a lo largo del proceso, le recomendamos que envíe sus comentarios sobre el alcance antes del 1 de octubre de 2004, para asegurar su consideración equitativa en el borrador EIS.

ATTACHMENT C

Fact Sheets

FACT SHEET

September 2004 Nellis AFB, NV

F-35 Force Development Evaluation and Weapons School Beddown Environmental Impact Statement

The Joint Strike Fighter—F-35

The F-35 Joint Strike Fighter aircraft is a multi-role fighter developed to meet the needs of the Air Force, Navy, Marine Corps, and allied air forces. For the Air Force, the aircraft is designed to compliment the F-22 and would replace the aging F-16 and A-10 fleets. Basing (or beddown) of the F-35 aircraft at Nellis Air Force Base (AFB) would provide the Air Force with the capability to meet Force Development Evaluation and Weapons School mission requirements by testing aircraft systems, developing and refining the tactics and maneuvers the aircraft can perform, and training aircrews to fly the F-35 under combat conditions.

Background

The concept for the F-35 aircraft began in the mid-1990s when Department of Defense leadership decided to use the latest jet fighter technology in a common airframe to meet the needs of several branches of the military. Common aircraft design features (e.g., airframe, engine, avionics) will maximize savings making it possible for the Air Force, Navy, and Marines to upgrade their aging aircraft fleets. Components of the Air Force F-35 that distinguish it from the other F-35 variants are an internal gun, infrared sensors, and laser target designator.

When teamed with the air dominance of the F-22, the avionics and stealth of the F-35 are intended to allow the aircraft to penetrate surface-to-air missile defenses to destroy targets.

What's Inside

What is the Proposed Action?

The Air Force proposes to establish the F-35 Force Development Evaluation and Weapons School programs at Nellis AFB, Nevada. The proposal would begin basing F-35 aircraft in fiscal year (FY) 2009 and continue thru FY 2019, for a total of 36 F-35s. Drawdown of the F-16s and A-10s being replaced by the F-35s would start in FY 2019. The proposal would also include construction of F-35 hangar/ maintenance units and an aerospace ground equipment facility; aircraft ramp space/parking; munitions storage igloos; operational support facilities; existing facility renovations; and required infrastructure improvements to support the beddown. Construction would begin in FY 2007 and be completed in FY 2013. Personnel changes, resulting in a slight reduction to overall base personnel, would occur from FY 2009 through FY 2028.

Purpose and Need of the Proposed Action

The purpose of the proposed action is to implement the F-35 FDE program and WS at Nellis AFB in response to the United States Congressional determination that the aging Air Force F-16 and A-10 fleets need to be replaced. The Force Development Evaluation program serves several important functions:

- refines employment doctrine and tactics in response to changing threats;
- develops or refines operational procedures and training programs;
- evaluates changes to the aircraft and verifies correction of new deficiencies discovered after system deployment;
- explores non-materiel (e.g., tactics) means of meeting changing operational requirements as long as the aircraft remains in the inventory;
- evaluates routine software changes (operational flight programs), preplanned product improvements, modifications, upgrades, mission data updates, and other improvements or changes as long as the aircraft is in the inventory;
- researches, demonstrates, exercises, analyzes, and evaluates tactics against anticipated threats; and
- ensures proper aircraft performance in combat by providing training, information on operational capabilities, and new requirements.

In addition to the FDE, the Air Force must establish and maintain a WS for each aircraft type in its inventory. This program operates throughout the life of the aircraft, adapting to changes in technology, tactics, and threats. Feedback to and from the FDE program is essential to the WS because it applies, evaluates, and refines tactics developed under FDE. The WS provides up-to-date training for pilots already qualified to fly the aircraft. With tactics and combat training as its focus, the WS offers rigorous, intensive, and realistic instruction that enables WS graduates to effectively teach combat skills to members of their home operational units.

An Overview of the National Environment Policy Act

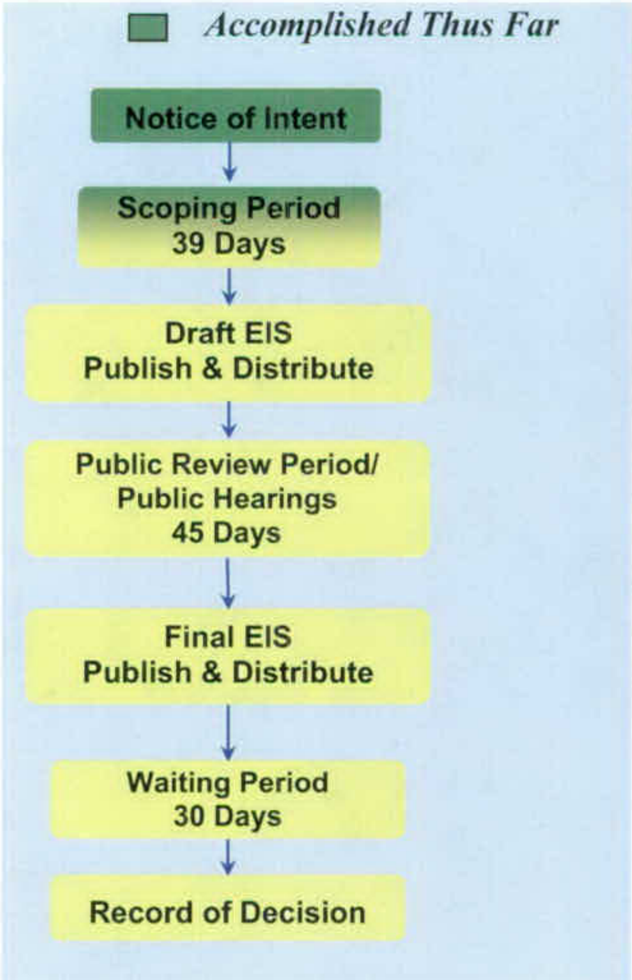
The National Environmental Policy Act (NEPA) is the national charter for promoting productive harmony between man and the environment and minimizing the impacts of federal actions. This law requires all federal agencies to consider potential environmental impacts in making decisions about those actions. Public involvement is an essential part of the process. Through involving the public and completing detailed environmental analysis, the NEPA process helps the decision-maker arrive at the best possible informed decision.

Informed Decision Making is Crucial

Informed decisions are based on a candid and factual presentation of environmental impacts. The Air Force is visiting communities potentially affected by the proposed action. They are seeking public input into this proposed action as well as seeking any new suggestions the public might have for the proposal to base the F-35 aircraft. To accomplish the EIS, the Air Force will collect data, conduct research, and analyze potential effects of the proposed action on the affected environment. Resources such as airspace management, noise, air quality, and potential effects on biological and cultural resources will be examined. The type and extent of impacts resulting from the proposed beddown will be identified and the degree to which these impacts might potentially affect resources will be analyzed and determined.

The Environmental Impact Analysis Process

The environmental impact analysis process (EIAP) began when the Air Force published a Notice of Intent in the *Federal Register* on August 23, 2004. This Notice announced that the Air Force plans to conduct an environmental analysis for the F-35 beddown. The scoping period also began at that time. Although comments are accepted throughout the environmental impact analysis process, the Air Force encourages submitting them no later than October 1, 2004 to ensure comments can be given full consideration early in the environmental impact analysis process. During the scoping period, preparation of the draft Environmental Impact Statement (EIS) begins. Scoping comments, research, agency and tribal consultation, and various studies contribute to completion of the draft EIS.



Once the draft EIS is completed, it will be published and its availability announced in the *Federal Register* and local newspapers. This initiates the official 45-day comment period. At this time, copies of the draft EIS will be sent to federal, state, and local agencies, American Indian Tribes, and to those citizens expressing an interest in receiving a copy. Public hearing meetings will be held approximately three weeks following the draft EIS publication. At these meetings the public will have the opportunity to express their concerns about the analyses and conclusions presented in the draft EIS. A court reporter will be present and all comments officially recorded.

Following the 45-day public comment period, preparation of the final EIS begins. At this time, all relevant comments will be evaluated and the final EIS revised (if necessary) to address these comments. Upon publication of the final EIS, its availability will be announced in the *Federal Register* and a 30-day waiting period begins. Following this waiting period, the Record of Decision will be published. This document will present the Air Force's decision regarding the proposal to base the F-35 for Force Development Evaluation and Weapons School at Nellis AFB.

Why Scoping is Important?

Scoping is just one of the tools used by federal agencies to obtain public input during the environmental impact analysis process. The goal of this process is for federal agencies to make informed decisions about their actions that could potentially affect the environment.

The Air Force uses input received during the scoping period to help identify issues for analysis. Issues raised during the scoping period are given full consideration and substantive and applicable issues will be addressed in the draft EIS. In a sense, scoping helps guide the environmental studies conducted by the Air Force for the EIS.

Scoping is not the only time when public input is critical to environmental impact analysis process. Public comments on the draft EIS will also be solicited and public hearings held following the draft EIS publication. Comments on the draft EIS help shape the final document and play an important role in determining the most suitable proposal for Air Force operations and the environment.

The Public Scoping Period

By participating in the scoping process, you will help Air Force representatives identify public issues and concerns, assist in defining the scope of analysis, as well as develop other reasonable alternatives for the F-35 beddown. The public can provide input in two ways:

1. By attending any one of five open house scoping meetings, anytime between 6 p.m. and 8 p.m. at the locations indicated below, or

SCHEDULE OF MEETINGS		
City/Town	***Date***	***Location***
Carson City	Monday, September 13	Plaza Hotel, 801 S. Carson Street
Alamo	Tuesday, September 14	Lincoln County Annex, 100 South First West Street
Pioche	Wednesday, September 15	Pioche Town Hall, Hinman and Main Streets
Pahrump	Thursday, September 16	Bob Rudd Community Center, 150 N. Highway 160
Las Vegas	Friday, September 17	Hollywood Recreation Center, 1650 S. Hollywood

2. By submitting written comments anytime during the public scoping period that began on August 23, 2004. Written comments should be sent to Mr. Mike Estrada, Air Warfare Center Public Affairs Office, Nellis AFB, at the address below. Although we will accept comments throughout the process, we recommend that your scoping comments be sent by October 1, 2004 to ensure equitable consideration in the draft EA analysis.

For more information about Nellis AFB, the proposed F-35 beddown, or to submit written comments, please contact:

Mike Estrada
Air Warfare Center/Public Affairs
4370 N. Washington Blvd., Suite 223
Nellis AFB, NV 89191-7078
Phone (702) 652-2753
Fax (702) 652-9838

HOJA DE INFORMACION

Nellis AFB, NV

Septiembre de 2004

Evaluación del Desarrollo de la Fuerza F-35 y Asentamiento de la Escuela de Armas Declaración de Impacto Ambiental

El avión de combate y ataque conjunto (Joint Strike Fighter)—F-35

El avión de combate y ataque conjunto F-35 es un avión de combate de múltiples misiones desarrollado para satisfacer las necesidades de la Fuerza Aérea, Marina, Infantería de Marina, y fuerzas aéreas aliadas. Para la Fuerza Aérea, el avión está diseñado para complementar el F-22 y reemplazaría al antiguo F-16 y las flotas A-10. La instalación (o asentamiento) de la Base de la Fuerza Aérea (AFB) para aviones F-35 en Nellis le daría a la Fuerza Aérea la capacidad de cumplir los requisitos de la misión de la Escuela de Armas y la Evaluación de Desarrollo de la Fuerza al probar los sistemas de los aviones, desarrollar y refinar las tácticas y maniobras que el avión puede realizar, y entrenar a la tripulación para volar el F-35 en condiciones de combate.

Antecedentes

El concepto para el avión F-35 comenzó a mediados de los 90s cuando el líder del Departamento de Defensa decidió usar la última tecnología de un jet de combate en un armazón común para satisfacer las necesidades de las diversas ramas del ejército. Las características del diseño de un avión común (por ejemplo, el armazón, motor, aviónica) maximizarán los ahorros haciendo posible que la Fuerza Aérea, Marina e Infantería de Marina modernicen sus flotas de aviones antiguos. Los componentes del F-35 de la Fuerza Aérea que lo distinguen de otras variantes del F-35 son un cañón interno, sensores infrarrojos y un indicador láser de objetivos.

Cuando se combina con el dominio del aire del F-22, la aviónica y sigilo del F-35 tienen el propósito de permitir que el avión penetre defensas de misiles de tierra al aire para destruir los objetivos.

Contenido

¿Cuál es la acción propuesta?

La Fuerza Aérea propone establecer los programas de Evaluación de Desarrollo de la Fuerza F-35 y la Escuela de Armas en Nellis AFB, Nevada. La propuesta comenzaría instalando la base para aviones F-35 en el año fiscal (FY) 2009 y continuaría hasta el FY 2019, para un total de 36 F-35. El retiro de los F-16 y A-10 que están siendo reemplazados por los F-35 comenzaría en FY 2019. La propuesta también incluiría la construcción de un hangar F-35 y unidades de mantenimiento, así como una instalación de equipo aeroespacial de tierra; una rampa/estacionamiento para los aviones; depósitos de hormigón para el almacenamiento de municiones; instalaciones de apoyo operativo; renovación de las instalaciones actuales y las mejoras de infraestructura necesarias para respaldar la instalación de la base. La construcción comenzaría en FY 2007 y concluiría en FY 2013. Los cambios de personal, que resultan en una ligera reducción del personal total en la base, ocurrirían del FY 2009 al FY 2028.

Propósito y necesidad de la acción propuesta

El propósito de la acción propuesta es implementar el programa FDE F-35 y WS en Nellis AFB, en respuesta a la decisión del Congreso de los Estados Unidos de que es necesario reemplazar las flotas de F-16 y A-10 antiguos de la Fuerza Aérea. El programa de Evaluación de Desarrollo de la Fuerza tiene distintas funciones importantes:

- perfecciona la doctrina y tácticas de utilización en respuesta a amenazas variables;
- desarrolla o perfecciona procedimientos operativos y programas de entrenamiento;
- evalúa los cambios a los aviones y verifica la corrección de nuevas deficiencias encontradas después del despliegue del sistema;
- explora medios no materiales (por ejemplo, tácticas) para satisfacer requisitos operativos variables, siempre que el avión continúe en el inventario;
- evalúa los cambios de rutina del software (programas operativos de vuelo), mejoras del producto planeadas anticipadamente, modificaciones, modernizaciones, actualizaciones de los datos de la misión, y otras mejoras o cambios siempre que el avión esté en el inventario;
- investiga, demuestra, hace uso de, analiza y evalúa tácticas contra amenazas anticipadas; y
- se asegura del adecuado desempeño del avión en combate al proporcionar entrenamiento, información sobre las capacidades operativas y nuevos requisitos.

Además de la FDE, la Fuerza Aérea debe establecer y mantener una WS por cada tipo de avión en su inventario. Este programa opera durante la vida útil del avión, adaptándose a cambios en la tecnología, tácticas y amenazas. Los comentarios para y del programa FDE son esenciales para la WS debido a que aplica, evalúa y perfecciona tácticas desarrolladas bajo FDE. La WS proporciona entrenamiento actualizado a los pilotos que ya están calificados para volar el aparato. Con tácticas y entrenamiento de combate como su enfoque, la WS ofrece instrucción rigurosa, intensiva y realista que permite a los graduados de WS enseñar con eficacia técnicas de combate a los miembros de sus unidades de operación.

Un resumen de la Ley de Política Nacional de Protección Ambiental

La Ley de Política Nacional de Protección Ambiental (NEPA) es el capítulo nacional para promover la armonía productiva entre el hombre y el medio ambiente, y reducir al mínimo los impactos de las acciones federales. Esta ley exige a todas las agencias federales considerar los posibles impactos ambientales al tomar decisiones sobre esas acciones. La participación del público es una parte esencial del proceso. A través de la participación del público y completando los análisis detallados sobre el medio ambiente, el proceso de NEPA ayuda a que los encargados de tomar las decisiones tomen la mejor decisión informada posible.

Tomar decisiones informadas es crucial

Las decisiones informadas se basan en la presentación abierta y objetiva de los impactos ambientales. La Fuerza Aérea está visitando las comunidades potencialmente afectadas por la acción propuesta. Están buscando comentarios públicos a esta acción propuesta, así como nuevas sugerencias que el público podría tener para la propuesta de instalar una base de aviones F-35. Para realizar la EIS, la Fuerza Aérea recopilará datos, conducirá una investigación y analizará los efectos potenciales de la acción propuesta sobre el medio ambiente afectado. Se estudiarán recursos como el manejo del espacio aéreo, el ruido, la calidad del aire, y los efectos potenciales sobre los recursos biológicos y culturales. Se identificarán el tipo y extensión de los impactos que resulten de la instalación de la base propuesta, y se analizará y determinará el grado en que estos impactos podrían afectar potencialmente los recursos.

El proceso de análisis del impacto ambiental

El proceso de análisis del impacto ambiental (EIAP) comenzó cuando la Fuerza Aérea publicó un Aviso de Intención en el *Registro Federal* el 23 de agosto de 2004. Este Aviso anunció que la Fuerza Aérea planea conducir un análisis ambiental para la instalación de la base F-35. El período de las juntas públicas de evaluación también comenzó en ese momento. Aunque se aceptan comentarios a lo largo de todo el proceso de análisis del impacto ambiental, la Fuerza Aérea alienta a que estos comentarios se envíen a más tardar el 1 de octubre de 2004 para garantizar que se les dé una total consideración en las primeras etapas del proceso de análisis del impacto ambiental. Durante el período de las juntas públicas de evaluación comenzará la preparación del borrador de la Declaración de Impacto Ambiental (EIS). Los comentarios de las juntas públicas de evaluación, la investigación, las consultas de la agencia y tribales, así como diversos estudios contribuyen a la terminación del borrador EIS.

El borrador EIS se publicará una vez que esté terminado, y su disponibilidad se anunciará en el *Registro Federal* y los periódicos locales. Esto inicia el período oficial de comentarios de 45 días. En este momento se enviarán copias del borrador EIS a las agencias federales, estatales y locales, a las tribus de indios americanos y a los ciudadanos que expresen su interés en recibir una copia. Se cederán audiencias públicas aproximadamente tres semanas después de la publicación del borrador EIS. En estas reuniones el público tendrá la oportunidad de expresar sus inquietudes acerca del análisis y conclusiones presentadas en el borrador EIS. Estará presente un escribiente judicial y se grabarán oficialmente todos los comentarios.

Después del período de comentarios públicos de 45 días, comenzará la preparación de la EIS final. En este momento se evaluarán todos los comentarios relevantes y se revisará el EIS final (si es necesario) para tratar estos comentarios. Al publicarse el EIS final, se anunciará su disponibilidad en el *Registro Federal* y comenzará un período de espera de 30 días. Después de este período de espera, se publicará el Registro de la Decisión. Este documento presentará la decisión de la Fuerza Aérea con respecto a la propuesta de instalar una base para la Evaluación del Desarrollo de la Fuerza F-35 y una Escuela de Armas en Nellis AFB.

¿Por qué son importantes las juntas públicas de evaluación?

Las juntas públicas de evaluación son sólo una de las herramientas utilizadas por las agencias federales para obtener comentarios del público durante el proceso de análisis del impacto ambiental. El objetivo de este proceso es que las agencias federales tomen decisiones informadas acerca de sus acciones que podrían afectar potencialmente el medio ambiente.

La Fuerza Aérea utiliza los comentarios recibidos durante el período de las juntas públicas de evaluación para ayudar a identificar temas para su análisis. Los temas surgidos durante las juntas públicas reciben una total consideración, y aquellos temas fundamentales y aplicables se tratarán en el borrador EIS. En un sentido, las juntas públicas de evaluación ayudan a guiar los estudios ambientales conducidos por la Fuerza Aérea para la EIS.

Las juntas públicas no es el único momento en el que los comentarios públicos son críticos para el proceso de análisis del impacto ambiental. También se solicitarán los comentarios públicos del borrador EIS, y se cederán audiencias públicas después de la publicación del borrador EIS. Los comentarios en el borrador EIS ayudan a desarrollar el documento final y juegan un papel importante para determinar la propuesta más idónea para las operaciones de la Fuerza Aérea y el medio ambiente.

El período de las juntas públicas de evaluación

1. Asistiendo a una de las cinco juntas públicas de evaluación, entre las 6:00 p.m. y 8:00 p.m., en los sitios indicados a continuación, o

CALENDARIO DE LAS REUNIONES		
Ciudad / Poblacion	*Fecha*	*Ubicación*
Carson City	Lunes 13 de septiembre	Plaza Hotel, 801 S. Carson Street
Alamo	Martes 14 de septiembre	Lincoln County Annex, 100 South First West Street
Pioche	Miércoles 15 de septiembre	Pioche Town Hall, Hinman y Main Streets
Pahrump	Jueves 16 de septiembre	Bob Rudd Community Center, 150 N. Highway 160
Las Vegas	Viernes 17 de septiembre	Hollywood Recreation Center, 1650 S. Hollywood

2. Enviando los comentarios por escrito durante el período de las juntas públicas de evaluación, el cual comienza el 23 de agosto de 2004. Los comentarios por escrito deberán enviarse a Mr. Mike Estrada, Air Warfare Center Public Affairs Office, Nellis AFB, a la dirección de abajo. Aunque aceptaremos comentarios a lo largo de todo el proceso, recomendamos que sus comentarios sean enviados antes del 1 de octubre de 2004 para garantizar su consideración equitativa en el análisis del borrador EA.

Para mayor información sobre Nellis AFB, propuesta para la instalación de la base F-35, ó para enviar comentarios por escrito, sírvase contactar a:

Mike Estrada
Air Warfare Center/Public Affairs
4370 N. Washington Blvd., Suite 223
Nellis AFB, NV 89191-7078
Phone (702) 652-2753
Fax (702) 652-9838

F-35 Beddown at Nellis AFB

FACT SHEET

Nellis AFB, NV

September 2004

F-35 Joint Strike Fighter

Mission

The F-35 is designed to complement the F-22 and replace the aging F-16 and A-10 fleets. It is primarily a *stealth* air-to-ground fighter, with air-to-air combat capability. During initial phases of an air campaign it performs stealthy strikes using an internal weapons load system that suppresses air defenses, hits heavily defended targets, and protects U.S. aircraft and ground forces from enemy ground attack. In later phases of a conflict, when stealth is not required, the F-35 can carry heavier external weapon loads.

Features

The multi-role F-35 (or Joint Strike Fighter [JSF]) builds on all current-generation fighter aircraft to offer superior capabilities. It was designed to replace a wide range of aging fighter and strike aircraft from the U.S. Air Force, Marine Corps, and Navy.

AFFORDABILITY: The F-35 evolved with focus on reducing the cost of development, procurement, and ownership. Joint development of the three F-35 variants takes advantage of economies of scale and allows an estimated 80 percent commonality in parts. Data show that the F-35 should cost 40 to 50 percent less to operate and support than comparable prior aircraft.

STEALTH: A combination of countermeasures, advanced avionics to enhance the pilot's situational awareness, low radar profile which allows weapons and fuel to be carried internally for maintaining low observability, and aircraft and weapons characteristics allow the F-35 to avoid, withstand, and counter enemy threats.

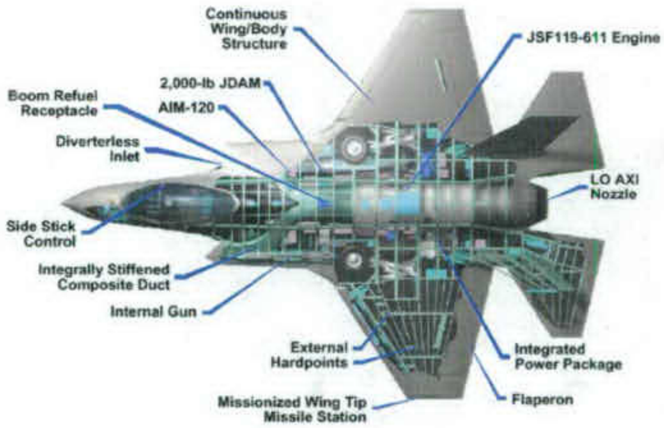
SUPPORTABILITY: The F-35 has a reduced logistics footprint making it significantly easier to deploy than the F-16 and an increased sortie generation rate to provide more combat power earlier in theater. An Autonomic Logistics Information System allows for integrated support and training for high reliability and maintainability.

WEAPONS: The F-35 payload is markedly greater than those of current fighter aircraft. It is designed to carry the newest air-to-ground munitions, such as Joint Direct Attack Munition (JDAM) and other ground attack weapons. In addition, it will carry air-to-air weapons such as an internal gun and missile. Integrated sensors will enhance delivery of current and future precision weapons to provide greater electronic domination of the battle space.

F-35 Development

The F-35 Joint Strike Fighter Program emerged from the Pentagon's Joint Advanced Strike Technology Program created in 1993 to define and develop technology that would support the future development of tactical aircraft. This program merged several independent government projects working on next-generation strike aircraft, including the Navy Attack/Fighter-Experimental, Air Force Multi-Role Fighter, and Marine Corps Common Affordable Lightweight Fighter projects. The goal was to build an affordable universal fighter that would meet the needs of all participants.

A 1994 Concept Exploration study found that a "tri-service family" of aircraft was the most affordable solution to the collective needs. This family entailed a single basic airframe design with three distinct variants: Conventional Take-Off and Landing (CTOL) for the U.S. Air Force; Short Take-Off/Vertical Landing (STOVL) for the U.S. Marine Corps; and a Carrier Variant (CV) for the U.S. Navy. Next, major aircraft manufacturers participated in a concept definition and design competition from which two concepts were selected as finalists in 1996 and development and testing of three different configurations of demonstrator aircraft began. From this concept demonstration phase, a construction contract was awarded to Lockheed Martin in October 2001. A Pratt & Whitney engine is integrated into this aircraft design.



Current plans call for 22 aircraft to be built in the initial System Development Demonstration Phase. The first prototypes are being assembled in Lockheed Martin's Fort Worth, Texas, facility and flight testing is proposed to be carried out at Edwards Air Force Base, California, and Patuxent River Naval Air Warfare Center, Maryland. Successful Preliminary Design Review was completed in April 2003 and critical Design Review is scheduled for April 2005. The first F-35 production airframe is expected to enter service in 2008.

F-35 Air Force Facts

Crew:	F-35, one pilot
Engine:	Pratt & Whitney F135 or General Electric F119 turbofan with 35,000 pounds of thrust (engines interchangeable across multi-service JSF aircraft)
Speed:	Maximum Mach 1 at altitude
Combat Radius:	Approximately 500 miles
Armament:	Primarily air-to-ground with air-to-air capability
Wing Span:	35 feet
Fuselage and tail:	Approximately 51 feet long and 17 feet high
Weight:	Maximum take-off, 50,000 pounds; empty, approximately 27,000 pounds
Contractor:	Lockheed Martin Corporation with partners Northrop Grumman and BAE Systems

ATTACHMENT D

IICEP Letters

F-35 IICEP Letters Sent Out		
Name	***Title***	***Group***
Native American Tribes		
Mr. Everet Pikayvitt	Tribal Representative	Moapa Band of Paiutes
Mr. Joe Kennedy	Tribal Representative	Timbisha Shoshone Tribe
Mr. Maurice Frank-Churchill	Tribal Representative	Duckwater Shoshone Tribe
Mr. Marian Zucco	Tribal Representative	Big Pine Paiute Tribe of the Owens Valley
Mr. Jason Warren	Tribal Representative	Big Pine Paiute Tribe of the Owens Valley
Ms. Gevene Savala	Tribal Representative	Kaibab Band of Southern Paiutes
Ms. Linda Otero	Tribal Representative	Fort Mojave Tribe
Mr. Richard Arnold	Tribal Chairman	Pahrump Paiute Tribe
Ms. Jessica Bacoch	Tribal Chairwoman	Big Pine Paiute Tribe of the Owens Valley
Mr. James Birchim	Tribal Chairman	Yomba Shoshone Tribe
Ms. Carmen Bradley	Tribal Chairwoman	Kaibab Band of Southern Paiutes
Mr. Daniel Eddy, Jr.	Tribal Chairman	Colorado River Indian Tribes
Ms. Nora Helton	Tribal Chairwoman	Fort Mojave Tribe
Ms. Gloria Hernandez	Tribal Chairwoman	Las Vegas Paiute Tribe
Ms. Rachel Joseph	Tribal Chairwoman	Lone Pine Paiute-Shoshone Tribe
Ms. Georgia Kennedy	Tribal Chairwoman	Timbisha Shoshone Tribe
Mr. Victor McQueen, Sr.	Tribal Chairman	Ely Shoshone Tribe
Ms. Rose Marie Saulque	Tribal Chairwoman	Benton Paiute Indian Tribe
Mr. Edward Smith	Tribal Chairman	Chemehuevi Indian Tribe
Mr. Philbert Swain	Tribal Chairman	Moapa Band of Paiutes
Ms. Lora Tom	Tribal Chairwoman	Paiute Indian Tribes of Utah
Mr. Doug Vega	Tribal Chairman	Bishop Paiute Indian Tribe
Mr. Richard Wilder	Tribal Chairman	For Independence Indian Tribe
Ms. Alfreida Walker	Tribal Chairwoman	Duckwater Shoshone Tribe
Mr. Kenny Andersen	Tribal Representative	Las Vegas Paiute Tribe
Mr. Felton Bricker	Tribal Representative	Fort Mojave Tribe
Ms. Lisa Cagle	Tribal Representative	Yomba Shoshone Tribe
Mr. Jerry Charles	Tribal Representative	Ely Shoshone Tribe
Mr. Lee Chavez	Tribal Representative	Bishop Paiute Indian Tribe
Ms. Betty L. Cornelius	Tribal Representative	Colorado River Indian Tribes
Ms. Darlene Dewey	Tribal Representative	Yomba Shoshone Tribe
Mr. Brenda Drye	Tribal Representative	Kaibab Band of Southern Paiutes
Unknown	Tribal Representative	Las Vegas Paiute Tribe
Ms. Pauline Esteves	Tribal Representative	Timbisha Shoshone Tribe
Mr. Maurice Frank-Churchill	Tribal Representative	Yomba Shoshone Tribe
Ms. Grace Goad	Tribal Representative	Timbisha Shoshone Tribe
Mr. Bill Helmer	Tribal Historic Preservation Officer	Timbisha Shoshone Tribe
Ms. Eleanor Hemphill	Tribal Representative	Fort Independence Indian Tribe
Ms. Clara Belle Jim	Tribal Representative	Pahrump Paiute Tribe
Mr. Gerald Kane	Tribal Representative	Bishop Paiute Indian Tribe
Mr. Darryl King	Tribal Representative	Chemehuevi Indian Tribe

F-35 IICEP Letters Sent Out (con't)		
Name	***Title***	***Group***
Ms. Lawanda Lafoon	Tribal Representative	Unknown
Ms. Cynthia V. Lynch	Tribal Representative	Pahrump Paiute Tribe
Ms. Tara Marlowe	Tribal Representative	Paiute Indian Tribes of Utah
Ms. Dorena Marineau	Tribal Representative	Paiute Indian Tribes of Utah
Mr. Calvin Meyers	Tribal Representative	Moapa Band of Paiutes
Ms. Lalovi Miller	Tribal Representative	Moapa Band of Paiutes
Ms. Gaylene Moose	Tribal Representative	Bishop Paiute Tribe
Ms. Lori Harrison	Chairwoman of the Board of Directors	Las Vegas Indian Center
Wildlife & BLM Offices		
Mr. Bill Fisher		BLM- Tonopah Field Office
Mr. Gene Kolkman		BLM- Ely Field Office
Mr. R. Michael Turnipseed	Director	Dept. of Conservation and Natural Resources, Nevada
Mr. Mark Morse	Office Manager	BLM- Las Vegas Field Office
Unknown	Unknown	Nevada Department of Wildlife
Mr. Robert Abbey	State Director	BLM
Mr. Dick Birger	Project Leader	Desert National Wildlife Refuge Complex Office
Ms. Amy Sprunger-Allworth		Desert National Wildlife Refuge Complex Office
Mr. Terry Crawfoth	Administrator	NV Department of Wildlife Reno Headquarters
Mr. Robert Williams	State Supervisor	U.S. Fish and Wildlife NV Ecological Field Office
State Historic Preservation Office		
Mr. Ronald James	SHPO	Historic Preservation Office
Environmental Offices		
Mr. Allen Biaggi	Administrator	NV Division of Environmental Protection, Capital Complex
Mr. Michael Stafford		NV State Clearinghouse Department of Administration
Mr. Wayne Nastri	Regional Administrator	U.S. EPA, Region IX Office of the Regional Administrator
Mr. Willie R. Taylor	Director	Office of Environmental Policy and Compliance
Unknown	Unknown	Nevada Division of Emergency Management
Honorable Raymond C. Shaffer		State Senate
Honorable Kenny Guinn	Governor of Nevada	
Honorable John Ensign	United States Senator	
Honorable Jon C. Porter		
Honorable Jim Gibbons		
Honorable Shelley Berkley		
Honorable Harry Reid	United States Senator	

F-35 IICEP Letters Sent Out (con't)		
Name	***Title***	***Group***
Office Holders		
Mr. Mike McGinness	Senate Member	Central Nevada Senatorial District
Mr. Mark E. Amodei		Capital Senatorial District- Republican
Terry Cage		Clark- 7th, Democrat
Ms. Maggie A. Carlton		Clark- 2nd, Democrat
Ms. Barbara Cegavske		Clark- 8th, Republican
Mr. Bob Coffin		Clark- 10th, Democrat
Mr. Warren B. Hardy		Clark- 12th, Republican
Mr. Joseph Neal		Clark- 4th, Democrat
Mr. Dennis Nolan		Clark- 9th, Republican
Ms. Ann O'Connell		Clark- 5th, Republican
Mr. Raymond D. Rawson		Clark- 6th, Republican
Mr. Michael Schneider		Clark- 11th, Democrat
Mr. Raymond C. Shaffer		Clark- 1st, Republican
Ms. Sandra Tiffany		Clark- 5th, Republican
Ms. Dina Titus		Clark- 7th, Republican
Ms. Valerie Wiener		Clark- 3rd, Democrat
Mr. Bob McCleary	Assembly Member	Clark County, District 11
Mr. David Goldwater	Assembly Member	Clark County, District 10
Mr. Tom Collins	Assembly Member	Clark County, District 1
Mr. Chris Munhall		Unknown
Mr. Bruce Woodbury	Commissioner	Clark County Board of Commissioners
Mr. Chis Giunchigliana	Assembly Member	Clark County, District 9
Mr. Barbara Buckley	Assembly Member	Clark County, District 8
Mr. Morse Arberry, Jr.	Assembly Member	Clark County, District 7
Mr. Wendell P. Williams	Assembly Member	Clark County, District 6
Ms. Valerie Weber	Assembly Member	Clark County, District 5
Mr. Harry Mortenson	Assembly Member	Clark County, District 42
Mr. David Parks	Assembly Member	Clark County, District 41
Mr. Ron Knecht	Assembly Member	Carson City (part), District 40
Ms. Lynn Hettrick	Assembly Member	Carson City (part), District 39
Mr. Bob Beers	Assembly Member	Clark County, District 4
Mr. Tom Grady	Assembly Member	Carson City (part), District 38
Mr. Marcus Conklin	Assembly Member	Clark County, District 37
Mr. Rod Sherer	Assembly Member	Clark County, District 36
Mr. William Horne	Assembly Member	Clark County, District 34
Ms. Peggy Pierce	Assembly Member	Clark County, District 3
Mr. Josh Griffin	Assembly Member	Clark County, District 29
Ms. Vonne Chowning	Assembly Member	Clark County, District 28
Mr. Richard Perkins	Assembly Member	Clark County, District 23
Mr. David Brown	Assembly Member	Clark County, District 22
Mr. Walter Andonov	Assembly Member	Clark County, District 21
Mr. Joe Hardy	Assembly Member	Clark County, District 20
Mr. Garn Mabey	Assembly Member	Clark County, District 2
Mr. Jerry D. Claborn	Assembly Member	Clark County, District 19
Mr. Mark Manendo	Assembly Member	Clark County, District 18

F-35 IICEP Letters Sent Out (con't)		
Name	***Title***	***Group***
Mr. Kelvin Atkinson	Assembly Member	Clark County, District 17
Mr. John Oceguera	Assembly Member	Clark County, District 16
Ms. Kathy McClain	Assembly Member	Clark County, District 15
Ms. Ellen Koivisto	Assembly Member	Clark County, District 14
Mr. Chad Christensen	Assembly Member	Clark County, District 13
Ms. Genie Ohrenschall	Assembly Member	Clark County, District 12
Mr. Rory Reed	Commissioner	Clark County Board of Commissioners
Ms. Yvonne Atkinson Gates	Commissioner	Clark County Board of Commissioners
Ms. Candice Trummell	Commissioner	Nye County Board of Commissioners
Mr. Henry Neth	Commissioner	Nye County Board of Commissioners
Ms. Joni Eastley	Commissioner	Nye County Board of Commissioners
Ms. Patricia Cox	Commissioner	Nye County Board of Commissioners
Ms. Roberta Carver	Commissioner	Nye County Board of Commissioners
Mr. Jim Manner	Commissioner	Lincoln County Board of Commissioners
Mr. Dan Frehner	Commissioner	Lincoln County Board of Commissioners
Mr. Paul Christensen	Commissioner	Lincoln County Board of Commissioners
Mr. Edward Wright	Commissioner	Lincoln County Board of Commissioners
Mr. Ray Flake	Commission Vice Chairman	Lincoln County Board of Commissioners
Mr. Chip Maxfield	Commissioner	Clark County Board of Commissioners
Ms. Mary Kincaid-Chauncey	Commissioner	Clark County Board of Commissioners
Mr. Mark James	Commissioner	Clark County Board of Commissioners
Ms. Myrna Williams	Commissioner	Clark County Board of Commissioners
Mr. Michael Bingham	Chairman	Indian Springs Town Board
City Mangers, Mayors, Chamber of Commerce		
		Pahrump Valley Chamber of Commerce
		North Las Vegas Chamber of Commerce
		Tonopah Nevada Chamber of Commerce
		Goldfield Chamber of Commerce
		Latin Chamber of Commerce
		Women's Chamber of Commerce of Nevada
		Armagosa Chamber of Commerce
		Las Vegas Chamber of Commerce
		Henderson Chamber of Commerce
		Asian Chamber of Commerce
		Beatty Chamber of Commerce
		Boulder City Chamber of Commerce
		Pioche Chamber of Commerce

F-35 IICEP Letters Sent Out (con't)		
Name	***Title***	***Group***
Mr. Glenn Van Roekel	City Manager	City of Caliente
Mr. Phil Speight	City Manager	City of Henderson
Mr. Gregory E. Rose	City Manager	City of North Las Vegas
Mr. Douglas Selby	City Manager	City of Las Vegas
Honorable Jim Gibson	Mayor of Henderson	
Honorable Robert Ferraro	Mayor of Boulder City	
Honorable Oscar B. Goodman	Mayor of Las Vegas	
Honorable Michael Montandon	Mayor of North Las Vegas	

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

1 2 AUG 2004

MEMORANDUM FOR: Mr. Everet Pikayvitt, Tribal Representative
Moapa Band of Paiutes
P.O. Box
Moapa NV 89025

FROM: HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley AFB VA 23665-2769

SUBJECT: Environmental Impact Statement for the F-35 Force Development Evaluation and Weapons School Permanent Beddown, Nellis Air Force Base Nevada

The United States Air Force (Air Force) is in the initial stages of preparing an Environmental Impact Statement (EIS) to analyze environmental impacts from permanently bedding down F-35 aircraft at Nellis Air Force Base (AFB) Nevada. The F-35 is the next generation, stealth air-to-ground fighter designed to complement the F/A-22 and replace the aging F-16 and A-10 aircraft fleets. The Air Force proposes to base, in phases, 36 F-35 aircraft at Nellis AFB between 2009 and 2028. Flight activities would occur in Nellis AFB and Nevada Test and Training Range (NTTR) airspace (see attached map). New construction required to support the beddown would occur on Nellis AFB over a three-year time period beginning in 2007. No new construction would occur on the NTTR.

In support of this process we request your input in identifying general or specific issues or areas of concern you feel should be addressed in the EIS. In addition, if your tribe recently completed, is currently implementing, or is planning to undertake any new activities which you believe should be included as part of our cumulative impact analysis, we ask you to identify the activity and provide a point of contact.

The Air Force plans to hold a series of scoping meetings to receive public input on alternatives, concerns, and issues to be addressed in the EIS. Meetings would be held at the following locations:

Sept 13, 6 p.m. – 8 p.m. Plaza Hotel, 801 S. Carson Street, Carson City
Sept 14, 6 p.m. – 8 p.m. Lincoln County Annex, 100 South First West Street, Alamo
Sept 15, 6 p.m. – 8 p.m. Pioche Town Hall, Hinman and Main Streets, Pioche
Sept 16, 6 p.m. – 8 p.m. Bob Ruud Community Center, 150 N. Highway 160, Pahrump
Sept 17, 6 p.m. – 8 p.m. Hollywood Recreation Center, 1650 S. Hollywood, Las Vegas

Please forward any identified issues or concerns to Sheryl Parker, F-35 EIS Project Manager at the above address. If you have any questions about the proposal, you may contact her at (757) 764-9334, or the Nellis AFB point of contact, Mr. Jim Campe. Mr. Campe may be reached at 99 CES/CEV, 4349 Duffer Drive, Ste 1601, Nellis AFB NV 89191 or at (702) 652-5813. We cordially request comments or concerns be sent by October 1, 2004; however, we will consider comments received at any time during the environmental process to the extent possible.

Jo Ann Whitson

JO ANN M. WHITSON
Chief, Environmental Analysis Branch

Atch
Map of Affected Area

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

16 AUG 2004

Brigadier General Patrick A. Burns
HQ ACC/CE
129 Andrews St., Suite 102
Langley AFB VA 23665-2769

The Honorable Harry Reid
United States Senator
Lloyd D. George Building
333 Las Vegas Boulevard South, Suite 8016
Las Vegas NV 89101

Dear Senator Reid

The United States Air Force (Air Force) is preparing an Environmental Impact Statement (EIS) to assess the potential environmental impacts associated with permanently bedding down F-35 aircraft at Nellis AFB Nevada. We plan to hold several public scoping meetings to solicit public and government agency comments on the proposal to assist us in shaping the analysis. We look forward to receiving your comments as part of this process.

The F-35 is the next generation stealth air-to-ground fighter, designed to complement the F/A-22 and replace the aging F-16 and A-10. The beddown at Nellis would support the Force Development Evaluation mission and the United States Air Force Weapons School and would occur in phases between the years 2009 and 2028. The proposed action would also include facility construction activities on Nellis AFB which would be phased over a three-year period.

Meetings will be held at the locations shown below. During the meetings, the Air Force will describe the proposed action and alternatives, the National Environmental Policy Act process and outline the opportunities for public involvement.

September 13, 6 p.m. - 8 p.m. Plaza Hotel, 801 S. Carson Street, Carson City
September 14, 6 p.m. - 8 p.m. Lincoln County Annex, 100 South First West Street, Alamo
September 15, 6 p.m. - 8 p.m. Pioche Town Hall, Hinman and Main Streets, Pioche
September 16, 6 p.m. - 8 p.m. Bob Rudd Community Center, 150 N. Highway 160, Pahrump
September 17, 6 p.m. - 8 p.m. Hollywood Recreation Center, 650 S. Hollywood, Las Vegas

If you or your staff has any questions or concerns about the proposal or process we would like to hear from you. Our EIS Project Manager is Ms. Sheryl Parker, HQ ACC/CEVP and can be reached at the above address or at (757) 764-9334.

Sincerely

V/R Patrick A. Burns

PATRICK A. BURNS
Brigadier General, USAF
The Civil Engineer

cc:
SAF/LL
HQ AF/ILEV

ATTACHMENT E

Draft Distribution List

Scoping Meeting Attendees

Meeting City	Prefix	First	Last	Organization Name	City	State
Carson City	Mr.	Mark	Harris	PUCN	Carson City	NV
	Mr.	Adam	Titus	Industrial Properties Development, Inc.	Las Vegas	NV
	Mr.	Alan	Caldwell	Sierra Concepts	Minden	NV
	Mr.	Tim	Anderson	Reno Gazette Journal	Carson City	NV
Alamo	Ms.	Marian	Fodge		Alamo	NV
	Mr.	Allan	Pritcher		Alamo	NV
	Mr.	Darrel	Jones		Alamo	NV
	Mr.	Lawrence	Woolever		Alamo	NV
	Mrs.	Paula	Woolever		Alamo	NV
	Mr.	David	Maxwell		Alamo	NV
	Ms.	Betty Jo	Jarvis		Hiko	NV
	Mr.	David	Hansen		Alamo	NV
	Ms.	Dominique	Slone		Hiko	NV
	Ms.	Debi	DeSchryver		Alamo	NV
	Mr.	Keith	Simmons		Alamo	NV
	Mr.	Adam	Titus	Industrial Properties Development, Inc.	Las Vegas	NV
	Ms.	Debbie	Meldrum		Alamo	NV
	Mr.	A.C.	Frehner		Alamo	NV
		C.	Balew		Alamo	NV
Pioche	Mr.	Joseph	Moffo		Pioche	NV
	Mr.	Randy	Johnson		Caliente	NV
	Mr.	Patrick	Gloeckner		Pioche	NV
	Mr.	Richard	Orr	BLM	Caliente	NV
Pahrump	Mr.	Gary	Hollis		Pahrump	NV
	Ms.	Geneva	Hollis		Pahrump	NV
	Mr.	Sheldon	Bass		Pahrump	NV
	Mr.	Arnold	Owen		Pahrump	NV
Las Vegas	Ms.	Elsie	Kelly		Las Vegas	NV
	Mr.	Jim	Aaron		Las Vegas	NV
	Mrs.	Patti	Aaron		Las Vegas	NV
	Mr.	David	Hermann		Las Vegas	NV
	Mr.	Dave	Trombley		Las Vegas	NV
	Mrs.	Sue	Trombley		Las Vegas	NV
	Mr.	Douglas	Crowe		Las Vegas	NV
	Mr.	David	Rosales		Las Vegas	NV
	Ms.	Linda	DeVine		Gloucester Pt.	VA
		Eric & Jacob	Marion		Las Vegas	NV
	Mr.	Michael	McEleney		Henderson	NV
	Ms.	Joann	Schoch		Henderson	NV

Additions to List

First	*MI*	*Last*	*Organization Name*	*City*	*State*
Robert		Hall	President, Nevada Environmental Coalition Inc.	Las Vegas	NV
			Rural Alliance for Military Accountability	Reno	NV

Congress-State
Elected Officials

Prefix	First	MI	Last	Title	Organization Name	City	State
Honorable	John		Ensign	U.S. Senator	Lloyd George Federal Bldg	Las Vegas	NV
Honorable	Harry		Reid	U.S. Senator	Lloyd George Federal Bldg	Las Vegas	NV
Honorable	Jim		Gibbons	Governor		Las Vegas	NV
Mr.	Mark	E.	Amodei	Senate Member	Capital Senatorial District	Carson City	NV
Honorable	Robert		Ferraro	Mayor of Boulder City	City Hall	Boulder City	NV
Honorable	James	B.	Gibson	Mayor of Henderson	City Hall	Henderson	NV
Honorable	Oscar	B.	Goodman	Mayor of Las Vegas	City Hall	Las Vegas	NV
Honorable	Michael		Montandon	Mayor of North Las Vegas	City Hall	North Las Vegas	NV
Honorable	Shelley		Berkley	U.S. Congresswoman	District 1	Las Vegas	NV
Honorable	Dean		Heller	U.S. Congressman	District 2	Las Vegas	NV
Honorable	Jon	C.	Porter	U.S. Congressman	District 3	Henderson	NV
Mr.	Phil		Speight	City Manager	City of Henderson	Henderson	NV
Mr.	Douglas		Selby	City Manager	City of Las Vegas	Las Vegas	NV
Mr.	Gregory	E.	Rose	City Manager	City of North Las Vegas	North Las Vegas	NV
Ms.	Marilyn		Kirkpatrick	Assembly Member, Clark County	District 1	North Las Vegas	NV
Mr.	John		Lee	Senate Member, Clark County	District 1	North Las Vegas	NV
Mr.	Garn		Mabey	Assembly Member, Clark County	District 2	Las Vegas	NV
Ms.	Maggie		Carlton	Senate Member, Clark County	District 2	Las Vegas	NV
Ms.	Peggy		Pierce	Assembly Member, Clark County	District 3	Las Vegas	NV
Ms.	Valerie		Wiener	Senate Member, Clark County	District 3	Las Vegas	NV
Ms.	Francis		Allen	Assembly Member, Clark County	District 4	Las Vegas	NV
Mr.	Steven		Horsford	Senate Member, Clark County	District 4	North Las Vegas	NV
Ms.	Valerie		Weber	Assembly Member, Clark County	District 5	Las Vegas	NV
Mr.	Joe		Heck	Senate Member, Clark County	District 5	Henderson	NV
Ms.	Joyce		Woodhouse	Senate Member, Clark County	District 5	Henderson	NV
Mr.	Harvey	J.	Munford	Assembly Member, Clark County	District 6	Las Vegas	NV
Mr.	Bob		Beers	Senate Member, Clark County	District 6	Las Vegas	NV
Mr.	Morse		Arberry Jr.	Assembly Member, Clark County	District 7	Las Vegas	NV
Mr.	Terry		Care	Senate Member, Clark County	District 7	Las Vegas	NV
Ms.	Dina		Titus	Senate Member, Clark County	District 7	Las Vegas	NV
Ms.	Barbara		Buckley	Assembly Member, Clark County	District 8	Las Vegas	NV
Ms.	Barbara		Cegavske	Senate Member, Clark County	District 8	Las Vegas	NV
Mr.	Tick		Segerblom	Assembly Member, Clark County	District 9	Las Vegas	NV
Mr.	Dennis		Nolan	Senate Member, Clark County	District 9	Las Vegas	NV
Mr.	Joseph	M	Hogan	Assembly Member, Clark County	District 10	Las Vegas	NV
Mr.	Bob		Coffin	Senate Member, Clark County	District 10	Las Vegas	NV
Mr.	Ruben		Kihuen	Assembly Member, Clark County	District 11	Las Vegas	NV
Mr.	Michael		Schneider	Senate Member, Clark County	District 11	Las Vegas	NV
Mr.	James		Ohrenschall	Assembly Member, Clark County	District 12	Las Vegas	NV
Mr.	Warren	B.	Hardy	Senate Member, Clark County	District 12	Las Vegas	NV
Mr.	Chad		Christensen	Assembly Member, Clark County	District 13	Las Vegas	NV
Ms.	Ellen		Koivisto	Assembly Member, Clark County	District 14	Las Vegas	NV
Ms.	Kathy		McClain	Assembly Member, Clark County	District 15	Las Vegas	NV
Mr.	John		Oceguera	Assembly Member, Clark County	District 16	Las Vegas	NV

Congress-State
Elected Officials

Prefix	First	MI	Last	Title	Organization Name	City	State
Mr.	Kelvin		Atkinson	Assembly Member, Clark County	District 17	North Las Vegas	NV
Mr.	Mark		Manendo	Assembly Member, Clark County	District 18	Las Vegas	NV
Mr.	Jerry	D.	Claborn	Assembly Member, Clark County	District 19	Las Vegas	NV
Mr.	Joe		Hardy	Assembly Member, Clark County	District 20	Boulder City	NV
Mr.	Bob		Beers	Assembly Member, Clark County	District 21	Henderson	NV
Mr.	Lynn		Stewart	Assembly Member, Clark County	District 22	Henderson	NV
Ms.	Rosemary		Womack	Assembly Member, Clark County	District 23	Henderson	NV
Mr.	Mo		Denis	Assembly Member, Clark County	District 28	Las Vegas	NV
Ms.	Susan		Gerhardt	Assembly Member, Clark County	District 29	Henderson	NV
Mr.	William		Horne	Assembly Member, Clark County	District 34	Las Vegas	NV
Mr.	Marcus		Conklin	Assembly Member, Clark County	District 37	Las Vegas	NV
Mr.	David		Parks	Assembly Member, Clark County	District 41	Las Vegas	NV
Mr.	Harry		Mortenson	Assembly Member, Clark County	District 42	Las Vegas	NV
Mr.	Mike		McGinness	Senate Member	Central Nevada Senatorial District	Fallon	NV
			Members		Indian Springs Town Advisory Board	Indian Springs	NV
Mr.	Bruce		Woodbury	Commissioner, District A	Clark County Board of Commissioners	Las Vegas	NV
Mr.	Tom		Collins	Commissioner, District B	Clark County Board of Commissioners	Las Vegas	NV
Mr.	Chip		Maxfield	Commissioner, District C	Clark County Board of Commissioners	Las Vegas	NV
Mr.	Lawrence		Weekly	Commissioner, District D	Clark County Board of Commissioners	Las Vegas	NV
Mr.	Chris		Giunchigliani	Commissioner, District E	Clark County Board of Commissioners	Las Vegas	NV
Ms.	Susan		Brager	Commissioner, District F	Clark County Board of Commissioners	Las Vegas	NV
Mr.	Rory		Reid	Commission Chairman	Clark County Board of Commissioners	Las Vegas	NV
Mr.	George	T.	Rowe	Commissioner	Lincoln County Board of Commissioners	Pioche	NV
Ms.	Rhonda		Hornbeck	Commission Chairman	Lincoln County Board of Commissioners	Pioche	NV
Mr.	Wade		Poulser	Commissioner	Lincoln County Board of Commissioners	Pioche	NV
Mr.	Bill		Loyd	Commissioner	Lincoln County Board of Commissioners	Pioche	NV
Mr.	Gary		Hollis	Commissioner, Chairperson	Nye County Board of Commissioners	Pahrump	NV
Ms.	Joni		Eastley	Commissioner Vice-Chair	Nye County Board of Commissioners	Tonopah	NV
Mr.	Peter		Liakopoulos	Commissioner	Nye County Board of Commissioners	Pahrump	NV
Ms.	Roberta		Carver	Commissioner	Nye County Board of Commissioners	Round Mountain	NV
Mr.	Andrew		Borasky	Commissioner	Nye County Board of Commissioners	Pahrump	NV
Ms.	Patrice		Lytle	City Clerk	City of Caliente	Caliente	NV

Federal-State Agencies

Prefix	First	MI	Last	Title	Organization Name	City	State
Mr.	Bill		Fisher		Bureau of Land Management Tonopah Field Station	Tonopah	NV
Ms.	Gosia		Targosz	Clearinghouse Coordinator	Nevada State Clearinghouse Department of Administration	Carson City	NV
Mr.	Ronald		James	SHPO	Historic Preservation Office	Carson City	NV
Mr.	Leo		Drozdoff	Administrator	Nevada Division of Env Protection State of Nevada, Capitol Complex	Carson City	NV
					Nevada Division of Emergency Management	Carson City	NV
					Nevada Department of Wildlife	Las Vegas	NV
Mr.	Juan		Palma	Office Manager	Bureau of Land Management Las Vegas Field Office	Las Vegas	NV
Mr.	Kenneth		Mayer	Director	Nevada Department of Wildlife Reno Headquarters	Reno	NV
Mr.	Robert		Williams	State Supervisor	U.S. Fish and Wildlife Service Nevada Ecological Field Office	Reno	NV
Mr.	Ron		Wenker	State Director	Bureau of Land Management State Office	Reno	NV
Mr.	Wayne		Nastri	Regional Administrator	U.S. EPA, Region IX Office of the Regional Administrator	San Francisco	CA
Mr.	Willie	R.	Taylor	Director	Office of Environmental Policy and Compliance U.S. Department of the Interior	Washington	DC
Mr.	John	A.	Ruhs		Bureau of Land Management-Ely Field Office	Ely	NV
Ms.	Cynthia		Martinez	Project Leader	Desert National Wildlife Refuge Complex Office	Las Vegas	NV
Ms.	Jennifer		Olsen		Southern Nevada Regional Planning Coalition, Clark County Clearinghouse	Henderson	NV

American Indians

Prefix	*First*	*MI*	*Last*	*Title*	*Organization Name*	*City*	*State*
Recipients of IICEP and NEPA Documents							
Mr.	Richard		Arnold	Tribal Chairman	Pahrump Paiute Tribe	Pahrump	NV
Mr.	Felton		Bricker	Tribal Representative	Fort Mojave Tribe	Mohave Valley	AZ
Ms	Vivienne		Caron-Jake	Tribal Representative	Kaibab Band of Southern Paiutes	Fredonia	AZ
Mr.	Maurice		Frank-Churchill	Tribal Representative	Yomba Shoshone Tribe	Duckwater	NV
Ms	Gaylene		Moose	Tribal Representative	Bishop Paiute Indian Tribe	Big Pine	CA

Chambers of Commerce

Organization Name	*City*	*State*
Beatty Chamber of Commerce	Beatty	NV
Boulder City Chamber of Commerce	Boulder City	NV
Tonopah Nevada Chamber of Commerce	Tonopah	NV
Henderson Chamber of Commerce	Henderson	NV
Las Vegas Chamber of Commerce	Las Vegas	NV
North Las Vegas Chamber of Commerce	North Las Vegas	NV
Asian Chamber of Commerce	Las Vegas	NV
Women's Chamber of Commerce of Nevada	Las Vegas	NV
Pahrump Valley Chamber of Commerce	Pahrump	NV
Amargosa Chamber of Commerce	Amargosa Valley	NV
Goldfield Chamber of Commerce	Goldfield	NV
Pioche Chamber of Commerce	Pioche	NV
Latin Chamber of Commerce	Las Vegas	NV

Libraries

Organization Name	*City*	*State*
Alamo Branch Library	Alamo	NV
Beatty Library District	Beatty	NV
Boulder City Library	Boulder City	NV
Caliente Branch Library	Caliente	NV
Nevada State Library and Archives Federal Publications	Carson City	NV
Indian Springs Library	Indian Springs	NV
James Dickinson Library	Las Vegas	NV
Las Vegas Library	Las Vegas	NV
North Las Vegas Library District Main Branch	North Las Vegas	NV
Pahrump Community Library	Pahrump	NV
Green Valley Library	Las Vegas	NV
Community College of Southern Nevada Library - Cheyenne Campus	North Las Vegas	NV
Business and Government Info. Center/322 - University of Nevada Libraries	Reno	NV
Tonopah Public Library	Tonopah	NV
Clark County Library	Las Vegas	NV
Sunrise Library	Las Vegas	NV
Lincoln County Library	Pioche	NV

ATTACHMENT F

SHPO Consultation

CEVN-

STATE OF NEVADA
DEPARTMENT OF CULTURAL AFFAIRS
Nevada State Historic Preservation Office
100 N. Stewart Street
Carson City, Nevada 89701
(775) 684-3448 • Fax (775) 684-3442
www.nvshpo.org

KENNY C. GUINN
Governor

SCOTT K. SISCO
Interim Director

RONALD M. JAMES
State Historic Preservation Officer

December 1, 2006

Eloisa V. Hopper
Chief, Environmental Flight
99 CES/CEV
4349 Duffer Drive, suite 1601
Nellis Air Force Base, NV 89191

Re: Report Titled 'Nellis Air Force Base (Nellis) – Historic Evaluation of Nine (9) Buildings (October 2006)' by Geo-Marine, Inc. and Determinations of Eligibility and Effect.

Dear Ms. Hopper:

Thank you for submitting the requested information. The Nevada State Historic Preservation Office (SHPO) has reviewed the subject undertaking for compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. Nellis proposes the demolition and replacement of the following buildings:

#	Name	Location	Built
1	Building #250	Nellis AFB	1956
2	Building #258	Nellis AFB	1956
3	Building #264	Nellis AFB	1971
4	Building #265	Nellis AFB	1956
5	Building #415	Nellis AFB	1953
6	Building #839	Nellis AFB	1955
7	Building #841	Nellis AFB	1956
8	Building #941	Nellis AFB	1951
9	Building #67	Creech AFB	1952

Area of Potential Effect (APE) for Nellis AFB (formerly Las Vegas Army Airfield)

Based on the information included in "Figure 3 – Evaluated Buildings within Areas I and III of the main base of Nellis AFB", the SHPO accepts the outlined APE for the evaluation of Buildings 250, 258, 264, 265, 415, 839, 841, and 941. Subject buildings are located within an area containing a high number of buildings and/or structures built after 1962.

Area of Potential Effect (APE) for Creech AFB (formerly Indian Springs AFB)

Based on the information included in "Figure 4 – Evaluated Buildings at Creech AFB', the SHPO accepts the APE.

Determinations of Eligibility

The SHPO concurs with the following Nellis' determinations of eligibility for the subject buildings:

#	Name	Current Function	Built	Eligibility
1	Building #250	HQ, 64^{th} and 65^{th} Aggressor Squadron	1956	Not Eligible
2	Building #258	HQ, 57^{th} Equipment Maintenance Squadron	1956	Not Eligible
3	Building #264	Weapons and Release Systems Shop	1971	Not Eligible
4	Building #265	Aircraft Maintenance Organizational Shop	1956	Not Eligible
5	Building #415	Aerospace Ground Equipment Facility	1953	Not Eligible
6	Building #839	Communication Facility (Laundry Facility)	1955	Not Eligible
7	Building #841	Base Cold Storage	1956	Not Eligible
8	Building #941	Pump Station, Liquid Fuel	1951	Not Eligible
9	Building #67	Administration Building	1952	Not Eligible

Determinations of Effect

The SHPO concurs with Nellis' determination of 'No Adverse Effect' for the subject undertaking.

If you have any questions, please contact me at 775-684-3444 or Rebecca R. Ossa, Architectural Historian at 775-687-3441 or via email at: rrossa@clan.lib.nv.us.

Sincerely,

Alice M Baldrica

Alice M. Baldrica, Deputy
State Historic Preservation Officer

ATTACHMENT G

Clark County Department of Air Quality Consultation

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

16 January 2008

Clark County Department of Air Quality and Environmental Management
500 S Grand Central Pkwy
PO Box 555210
Las Vegas, NV 89155-5210

Dear Mr. Deyo,

Please consider this our formal request to include nitrogen oxide (NO_x) emissions from the proposed F-35 beddown at Nellis AFB, Nevada, in Clark County's upcoming State Implementation Plan (SIP) revision for ozone. As was discussed between representatives of Nellis AFB, Clark County Dept of Air Quality and Environmental Management, and Headquarters Air Combat Command, the County may be able to accommodate the additional 185 tons of NO_x which would be emitted per year, as part of Clark County's Ozone SIP revision to meet National Ambient Air Quality Standard compliance. This would allow the AF to comply with General Conformity requirements, as outlined in Section 176(c) of the Clean Air Act, as well as demonstrating conformity under 40 CFR 93.158(a)(1). We request that you provide us with formal confirmation that this accommodation can be made.

The proposed beddown of F-35 aircraft would begin in 2009, with construction continuing through 2014. The first aircraft would arrive in 2012, and conclude in 2022 with a total of 36 F-35. NO_x emissions would remain below de minimis levels per year, until the aircraft number reaches 24, expected in 2017, increasing NO_x emissions to 125 tons/year. By 2022, NO_x emissions generated either directly or indirectly from the proposed beddown would be 185 tons per year. We have attached a general spreadsheet which illustrates the projected emissions per year for all criteria pollutants associated with the proposed beddown. Should the projected emissions increase or decrease based on revised engine emission data, our environmental analysis would be updated, with your coordination.

HQ ACC point of contact for this conformity determination is Ms. Sheryl K. Parker. She may be contacted at 757.764.9334 if you have any questions pertaining to this request.

BRUCE W. MACDONALD, P.E.
Headquarters Air Combat Command
Chief, Programs Division

Attachment:
F-35 Proposed Emissions

F-35 Beddown TOTAL Air Emissions
Tons/Year
Includes construction, commuting, and operational emissions

2009

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
0.12	0.50	1.19	0.13	1.21	0.18

2010

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
0.90	5.29	6.26	0.67	3.90	0.75

2011

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
0.59	2.78	5.50	0.61	4.26	0.73

2012

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
2.23	24.80	31.81	1.24	8.20	8.20

2013

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
3.15	28.36	39.57	2.12	22.31	10.02

2014

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
3.10	31.73	34.46	1.48	9.62	8.48

2015

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
4.36	49.64	62.51	3.49	17.39	17.39

2017

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
7.38	86.80	123.69	6.97	34.71	34.71

2022

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
10.40	123.96	184.87	9.45	51.03	51.03

APPENDIX B
AIRCRAFT OPERATIONS

APPENDIX B
AIRCRAFT OPERATIONS

1.0 INTRODUCTION

The following tables provide details on baseline and projected sortie-operations within NTTR and associated airspace.

- Table B-1 summarizes sortie-operations for the two MOAs and four restricted areas. It compares low-use and high-use scenarios for both baseline and projected conditions.
- Tables B-2 and B-3 provide a breakdown of baseline sortie-operations by aircraft type and within subdivisions of the airspace units. Table B-3 shows the high-end (300,000 sortie-operations). These data reflect conditions described in the beddown EIS for the F-22 at Nellis AFB in 1999.
- Tables B-4 and B-5 provide a breakdown of projected sortie-operations by aircraft type and within subdivision of the airspace units. Table B-4 depicts the lower end of the range (251,840 sortie-operations). Table B-2 shows the high-end (351,840 sortie-operations).

Table B-1 Projected Sortie-Operations Within the Airspace Under the Proposed Action

	Baseline		***F-35 Sortie-Operations***	***Projected***		***Percent Change***	
	200,000 Scenario	*300,000 Scenario*		*251,840+ Scenario*	*351,840+ Scenario*	*251,840+ Scenario*	*351,840+ Scenario*
Desert MOA	51,224	76,170	15,480	66,704	91,650	30%	20%
Reveille MOA	14,038	20,912	4,270	18,308	25,181	30%	20%
R-4806	30,134	44,135	4,322	34,456	48,457	14%	10%
R-4807	74,128	112,122	19,683	93,810	131,804	27%	18%
R-4808	12,952	20,007	3,368	16,321	23,376	26%	17%
R-4809	17,524	26,655	4,717	22,242	31,372	27%	18%
Total	**200,000**	**300,000**	**51,840**	**251,840**	**351,840**	**26%**	**17%**

Table B-2 Baseline Distribution by Aircraft Type and Subdivision – 200,000 Sortie-Operations Annually

		AV-8	A-10	B-1	B-2	B-52	C-130	C-141	E-3	EA-6G	F-14	F-15	F-16	F-18	F-22	F-117	KC-10	KC-135	Mirage	Small Prop	Tornado	Helos	Predator	Other	Airspace Subunit Total
Desert MOA																									
	Caliente	138	69	54	10	9	836	101	161	471	31	4,761	11,232	948	3,559	26	26	883	333	54	5	250		65	24,022
	Coyote	104	83	38	7	7	419	50	1	235	18	2,797	6,819	533	2,091	16	13	444	225	26	45	225		41	14,236
	Eglin	120	92	19	3	5	417	51	2	236	15	2,601	6,214	484	1,942	9	13	443	111	26	3	128		31	12,966
Total		362	244	111	20	21	1,672	202	164	942	64	10,159	24,265	1,965	7,592	51	52	1,770	669	106	53	603	-	137	51,224
Reveille MOA		102	71	38	7	7	419	50	1	235	17	2,801	6,668	530	2,094	17	13	443	225	30	47	181		42	14,038
R 4806										-															
	R61	79	988	1	2	2	4				0	393	1,314	29	293	2		2		1		158	744	1	4,014
	R62	97	1,156	1	2	2	4				0	501	1,488	38	374	2		3		1		173	744	441	5,027
	R63	19	1,139	1		2	7				0	542	1,716	37	404	3		1				211	744	441	5,267
	R64	78	1,164	1	2	2	5				0	449	1,505	40	334	2		1				188	744	1,102	5,617
	R65	81	1,189	1	2	2	8				0	458	2,858	36	342	2		2		8		177	744	441	6,351
	Alamo	97	1,148	1	2	2	5				0	501	1,504	45	373	2		2				176		-	3,858
Total		451	6,784	4	10	14	33	-	-	-	1	2,844	10,385	225	2,120	13	-	11	-	10	-	1,083	3,720	2,426	30,134
R 4807																									
	EC South	27	526	7	1	2	1				5	875	3,214	125	653	3		3	25	2	46	85		450	6,050
	Pahute Mesa	22	149	4	1	2	1				4	995	2,849	128	741			1				70		231	5,197
	R71	66	517	20	3	5				1	11	1,478	4,806	286	1,104	9		3	114		43	62		627	9,154
	R74	150	123	60	13	9	1		1		27	3,989	9,732	782	2,984	28		2	380	347	47	954		629	20,260
	R75	132	212	47	10	8	1			1	22	3,353	8,473	642	2,508	21		2	291	347	41	947		644	17,702
	R76	126	559	46	9	8	1				22	2,726	7,914	605	2,040	22		3	291	347	46	104		896	15,765
Total		523	2,086	184	37	34	5	-	1	2	92	13,416	36,988	2,568	10,030	83	-	14	1,101	1,043	223	2,222	-	3,477	74,128
R 4808																									
	R4808W	73	189	23	4	4	2				12	1,907	5,019	340	1,425	10		3	133		4	76		445	9,668
	R4808E			-		0					-	305	434		227						41	1,174		1,103	3,284
Total		73	189	23	4	4	2	-	-	-	12	2,211	5,453	340	1,652	10	-	3	133	-	45	1,250	-	1,548	12,952
R 4809			2									114	266		85					347		441		661	1,916
	EC East	42	134	14	4	4	1				8	1,612	4,198	239	1,203	5		2	69	347	46	97		10	8,035
	EC West	45	149	11	2	3	1		1		7	1,373	3,893	198	1,024	3		1	47		46	100		671	7,574
Total		87	285	25	6	6	2	-	1	-	15	3,099	8,357	437	2,312	8	-	3	116	694	92	638	-	1,342	17,524
	TOTAL	1,598	9,659	385	84	85	2,133	252	167	1,179	200	34,530	92,116	6,065	25,800	182	65	2,244	2,244	1,883	460	5,977	3,720	8,972	200,000

Table B-3 Baseline Distribution by Aircraft Type and Subdivision – 300,000 Sortie-Operations

		AV-8	A-10	B-1	B-2	B-52	C-130	C-141	E-3	EA-6G	F-14	F-15	F-16	F-18	F-22	F-117	KC-10	KC-135	Mirage	Small Prop	Tornado	Helos	Predator	Other	Subunit Total
Desert MOA																									
	Caliente	207	103	325	16	58	1,254	151	243	707	186	8,163	16,849	1,421	3,559	40	39	1,325	500	81	8	374		128	35,737
	Coyote	156	125	226	9	43	628	75	1	353	105	4,794	10,228	800	2,091	25	20	665	337	39	68	337		81	21,206
	Eglin	179	139	116	5	29	626	75	3	353	90	4,459	9,320	725	1,942	14	20	665	167	39	5	193		62	19,227
Total		542	367	668	30	129	2,508	301	247	1,413	382	17,416	36,397	2,946	7,592	79	79	2,655	1,004	159	81	904	-	271	76,170
Reveille MOA		154	107	228	10	41	628	75	1	353	102	4,802	10,002	795	2,094	26	20	665	337	47	70	272		82	20,912
R 4806																									
	R61	118	1,483	4	3	14	7				1	674	1,971	44	293	3		3		1		237	744	2	5,603
	R62	146	1,736	4	3	14	7				1	860	2,233	57	374	3		4		1		259	744	875	7,321
	R63	29	1,708	4		-	10				1	929	2,574	56	404	4		1				316	744	875	7,655
	R64	117	1,746	4	3	14	8				0	770	2,257	60	334	3		1				282	744	2,189	8,532
	R65	121	1,780	4	3	14	12				0	785	4,285	55	342	3		3		12		265	744	875	9,303
	Alamo	146	1,721	3	3	14	8				0	858	2,256	68	373	3		3				264			5,721
Total		677	10,174	23	15	70	52	-	-	-	5	4,876	15,576	340	2,120	19	-	15	-	14	-	1,623	3,720	4,816	44,135
R 4807																									
	EC South	41	788	40	1	15	1				32	1,499	4,822	187	653	4		4	37	3	69	128		892	9,215
	Pahute Mesa	33	224	21	1	9	1				25	1,705	4,274	191	741			1				105		458	7,789
	R71	99	776	118	5	28				1	66	2,533	7,209	429	1,104	14		4	170		65	92		1,244	13,957
	R74	225	184	362	18	60	1		1		164	6,839	14,598	1,173	2,984	42		3	570	520	69	1,431		1,249	30,492
	R75	198	318	283	15	49	1			1	134	5,748	12,709	962	2,508	32		3	437	520	61	1,421		1,278	26,677
	R76	189	839	277	14	50	1				134	4,673	11,871	908	2,040	33		4	437	520	69	156		1,777	23,991
Total		785	3,129	1,102	54	210	5	-	1	2	553	22,997	55,483	3,850	10,030	125	-	19	1,651	1,563	333	3,333	-	6,897	112,122
R 4808																									
	R4808W	110	284	137	8	24	3				72	3,270	7,528	511	1,425	15		4	200		7	114		882	14,594
	R4808E			-		-					-	522	651		227						61	1,762		2,190	5,413
Total		110	284	137	8	24	3	-	-	-	72	3,792	8,179	511	1,652	15	-	4	200	-	68	1,876	-	3,072	20,007
R 4809			3	-		-					-	196	399		85					520		661		1,312	3,176
	EC East	63	201	86	6	22	1				48	2,763	6,297	359	1,203	7		3	107	520	69	146		19	11,920
	EC West	67	224	63	3	17	1		1		39	2,353	5,840	296	1,024	5		1	71	3	69	150		1,332	11,559
Total		130	428	149	9	39	2	-	1	-	87	5,312	12,536	655	2,312	12	-	4	178	1,043	138	957	-	2,663	26,655
	TOTAL	**2,398**	**14,489**	**2,307**	**126**	**513**	**3,198**	**376**	**250**	**1,768**	**1,202**	**59,195**	**138,173**	**9,097**	**25,800**	**276**	**99**	**3,362**	**3,370**	**2,826**	**690**	**8,965**	**3,720**	**17,801**	**300,000**

Table B-4 Projected Distribution by Aircraft Type and Subdivision – 251,840 Sortie-Operations

		AV-8	A-10	B-1	B-2	B-52	C-130	C-141	E-3	EA-6G	F-14	F-15	F-16	F-18	F-22	F-35	F-117	KC-10	KC-135	Mirage	Small Prop	Tornado	Helos	Predator	Other	Airspace Subunit Total
Desert MOA																										
	Caliente	138	69	54	10	9	836	101	161	471	31	4,761	11,232	948	3,559	7,256	26	26	883	333	54	5	250		65	31,279
	Coyote	104	83	38	7	7	419	50	1	235	18	2,797	6,819	533	2,091	4,264	16	13	444	225	26	45	225		41	18,499
	Eglin	120	92	19	3	5	417	51	2	236	15	2,601	6,214	484	1,942	3,960	9	13	443	111	26	3	128		31	16,926
Total		362	244	111	20	21	1,672	202	164	942	64	10,159	24,265	1,965	7,592	15,480	51	52	1,770	669	106	53	603	-	137	66,704
Reveille MOA		102	71	38	7	7	419	50	1	235	17	2,801	6,668	530	2,094	4,270	17	13	443	225	30	47	181		42	18,308
R 4806																										
	R61	79	988	1	2	2	4				0	393	1,314	29	293	598	2		2		1		158	744	1	4,611
	R62	97	1,156	1	2	2	4				0	501	1,488	38	374	762	2		3		1		173	744	441	5,790
	R63	19	1,139	1		2	7				0	542	1,716	37	404	824	3		1				211	744	441	6,091
	R64	78	1,164	1	2	2	5				0	449	1,505	40	334	680	2		1				188	744	1,102	6,297
	R65	81	1,189	1	2	2	8				0	458	2,858	36	342	697	2		2		8		177	744	441	7,048
	Alamo	97	1,148	1	2	2	5				0	501	1,504	45	373	761	2		2				176		-	4,619
Total		451	6,784	4	10	14	33	-	-	-	1	2,844	10,385	225	2,120	4,322	13	-	11	-	10	-	1,083	3,720	2,426	34,456
R 4807																										
	EC South	27	526	7	1	2	1				5	875	3,214	125	653	1,332	3		3	25	2	46	85		450	7,382
	Pahute Mesa	22	149	4	1	2	1				4	995	2,849	128	741	1,511			1				70		231	6,708
	R71	66	517	20	3	5				1	11	1,478	4,806	286	1,104	2,251	9		3	114		43	62		627	11,405
	R74	150	123	60	13	9	1		1		27	3,989	9,732	782	2,984	6,085	28		2	380	347	47	954		629	26,345
	R75	132	212	47	10	8	1			1	22	3,353	8,473	642	2,508	4,344	21		2	291	347	41	947		644	22,046
	R76	126	559	46	9	8	1				22	2,726	7,914	605	2,040	4,160	22		3	291	347	46	104		896	19,925
Total		523	2,086	184	37	34	5	-	1	2	92	13,416	36,988	2,568	10,030	19,683	83	-	14	1,101	1,043	223	2,222	-	3,477	93,810
R 4808																										
	R4808W	73	189	23	4	4	2				12	1,907	5,019	340	1,425	2,906	10		3	133		4	76		445	12,574
	R4808E			-		0					-	305	434		227	463						41	1,174		1,103	3,747
Total		73	189	23	4	4	2	-	-	-	12	2,211	5,453	340	1,652	3,368	10	-	3	133	-	45	1,250	-	1,548	16,321
R 4809			2									114	266		85	174					347		441		661	2,090
	EC East	42	134	14	4	4	1				8	1,612	4,198	239	1,203	2,453	5		2	69	347	46	97		10	10,488
	EC West	45	149	11	2	3	1		1		7	1,373	3,893	198	1,024	2,091	3		1	47		46	100		671	9,664
Total		87	285	25	6	6	2	-	1	-	15	3,099	8,357	437	2,312	4,717	8	-	3	116	694	92	638	-	1,342	22,242
	TOTAL	1,598	9,659	385	84	85	2,133	252	167	1,179	200	34,530	92,116	6,065	25,800	51,840	182	65	2,244	2,244	1,883	460	5,977	3,720	8,972	251,840

Table B-5 Projected Distribution by Aircraft Type and Subdivision – 351,840 Sortie-Operations

		AV-8	A-10	B-1	B-2	B-52	C-130	C-141	E-3	EA-6G	F-14	F-15	F-16	F-18	F-22	F-35	F-117	KC-10	KC-135	Mirage	Small Prop	Tornado	Helos	Predator	Other	Airspace Subunit Total
Desert MOA																										
	Caliente	207	103	325	16	58	1,254	151	243	707	186	8,163	16,849	1,421	3,559	7,256	40	39	1,325	500	81	8	374		128	42,993
	Coyote	156	125	226	9	43	628	75	1	353	105	4,794	10,228	800	2,091	4,264	25	20	665	337	39	68	337		81	25,470
	Eglin	179	139	116	5	29	626	75	3	353	90	4,459	9,320	725	1,942	3,960	14	20	665	167	39	5	193		62	23,187
Total		542	367	668	30	129	2,508	301	247	1,413	382	17,416	36,397	2,946	7,592	15,480	79	79	2,655	1,004	159	81	904	-	271	91,650
Reveille MOA		154	107	228	10	41	628	75	1	353	102	4,802	10,002	795	2,094	4,270	26	20	665	337	47	70	272		82	25,181
R 4806																										
	R61	118	1,483	4	3	14	7				1	674	1,971	44	293	598	3		3		1		237	744	2	6,200
	R62	146	1,736	4	3	14	7				1	860	2,233	57	374	762	3		4		1		259	744	875	8,083
	R63	29	1,708	4		-	10				1	929	2,574	56	404	824	4		1				316	744	875	8,479
	R64	117	1,746	4	3	14	8				0	770	2,257	60	334	680	3		1				282	744	2,189	9,212
	R65	121	1,780	4	3	14	12				0	785	4,285	55	342	697	3		3		12		265	744	875	10,000
	Alamo	146	1,721	3	3	14	8				0	858	2,256	68	373	761	3		3				264			6,482
Total		677	10,174	23	15	70	52	-	-	-	5	4,876	15,576	340	2,120	4,322	19	-	15	-	14	-	1,623	3,720	4,816	48,457
R 4807																										
	EC South	41	788	40	1	15	1				32	1,499	4,822	187	653	1,332	4		4	37	3	69	128		892	10,547
	Pahute Mesa	33	224	21	1	9	1				25	1,705	4,274	191	741	1,511			1				105		458	9,300
	R71	99	776	118	5	28				1	66	2,533	7,209	429	1,104	2,251	14		4	170		65	92		1,244	16,208
	R74	225	184	362	18	60	1		1		164	6,839	14,598	1,173	2,984	6,085	42		3	570	520	69	1,431		1,249	36,578
	R75	198	318	283	15	49	1			1	134	5,748	12,709	962	2,508	4,344	32		3	437	520	61	1,421		1,278	31,021
	R76	189	839	277	14	50	1				134	4,673	11,871	908	2,040	4,160	33		4	437	520	69	156		1,777	28,151
Total		785	3,129	1,102	54	210	5	-	1	2	553	22,997	55,483	3,850	10,030	19,683	125	-	19	1,651	1,563	333	3,333	-	6,897	131,804
R 4808																										
	R4808W	110	284	137	8	24	3				72	3,270	7,528	511	1,425	2,906	15		4	200		7	114		882	17,500
	R4808E			-		-					-	522	651		227	463						61	1,762		2,190	5,876
Total		110	284	137	8	24	3	-	-	-	72	3,792	8,179	511	1,652	3,368	15	-	4	200	-	68	1,876	-	3,072	23,376
R 4809			3	-		-					-	196	399		85	174					520		661		1,312	3,349
	EC East	63	201	86	6	22	1				48	2,763	6,297	359	1,203	2,453	7		3	107	520	69	146		19	14,373
	EC West	67	224	63	3	17	1		1		39	2,353	5,840	296	1,024	2,091	5		1	71	3	69	150		1,332	13,650
Total		130	428	149	9	39	2	-	1	-	87	5,312	12,536	655	2,312	4,717	12	-	4	178	1,043	138	957	-	2,663	31,372
	TOTAL	2,398	14,489	2,307	126	513	3,198	376	250	1,768	1,202	59,195	138,173	9,097	25,800	51,840	276	99	3,362	3,370	2,826	690	8,965	3,720	17,801	351,840

APPENDIX C
NOISE

APPENDIX C
NOISE

Noise is generally described as unwanted sound. Unwanted sound can be based on objective effects (such as hearing loss or damage to structures) or subjective judgments (community annoyance). Noise analysis thus requires a combination of physical measurement of sound, physical and physiological effects, plus psycho- and socio-acoustic effects.

Section 1.0 of this appendix describes how sound is measured and summarizes noise impacts in terms of community acceptability and land use compatibility. Section 2.0 gives detailed descriptions of the effects of noise that lead to the impact guidelines presented in Section 1.0. Section 3.0 provides a description of the specific methods used to predict aircraft noise, including a detailed description of sonic booms.

1.0 NOISE DESCRIPTORS AND IMPACT

Aircraft operating in military airspace generate two types of sound. One is "subsonic" noise, which is continuous sound generated by the aircraft's engines and also by air flowing over the aircraft itself. The other is sonic booms (where authorized for supersonic), which are transient impulsive sounds generated during supersonic flight. These are quantified in different ways.

Section 1.1 describes the characteristics which are used to describe sound. Section 1.2 describes the specific noise metrics used for noise impact analysis. Section 1.3 describes how environmental impact and land use compatibility are judged in terms of these quantities.

1.1 Quantifying Sound

Measurement and perception of sound involve two basic physical characteristics: amplitude and frequency. Amplitude is a measure of the strength of the sound and is directly measured in terms of the pressure of a sound wave. Because sound pressure varies in time, various types of pressure averages are usually used. Frequency, commonly perceived as pitch, is the number of times per second the sound causes air molecules to oscillate. Frequency is measured in units of cycles per second, or hertz (Hz).

Amplitude. The loudest sounds the human ear can comfortably hear have acoustic energy one trillion times the acoustic energy of sounds the ear can barely detect. Because of this vast range, attempts to represent sound amplitude by pressure are generally unwieldy. Sound is, therefore, usually represented on a logarithmic scale with a unit called the decibel (dB). Sound measured on the decibel scale is referred to as a sound level. The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB.

Because of the logarithmic nature of the decibel scale, sounds levels do not add and subtract directly and are somewhat cumbersome to handle mathematically. However, some simple rules of thumb are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example:

60 dB + 60 dB = 63 dB, and

80 dB + 80 dB = 83 dB.

The total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

60.0 dB + 70.0 dB = 70.4 dB.

Because the addition of sound levels behaves differently than that of ordinary numbers, such addition is often referred to as "decibel addition" or "energy addition." The latter term arises from the fact that the combination of decibel values consists of first converting each decibel value to its corresponding acoustic energy, then adding the energies using the normal rules of addition, and finally converting the total energy back to its decibel equivalent.

The difference in dB between two sounds represents the ratio of the amplitudes of those two sounds. Because human senses tend to be proportional (i.e., detect whether one sound is twice as big as another) rather than absolute (i.e., detect whether one sound is a given number of pressure units bigger than another), the decibel scale correlates well with human response.

Under laboratory conditions, differences in sound level of 1 dB can be detected by the human ear. In the community, the smallest change in average noise level that can be detected is about 3 dB. A change in sound level of about 10 dB is usually perceived by the average person as a doubling (or halving) of the sound's loudness, and this relation holds true for loud sounds and for quieter sounds. A decrease in sound level of 10 dB actually represents a 90 percent decrease in sound *intensity* but only a 50 percent decrease in perceived *loudness* because of the nonlinear response of the human ear (similar to most human senses).

The one exception to the exclusive use of levels, rather than physical pressure units, to quantify sound is in the case of sonic booms. As described in Section 3.2, sonic booms are coherent waves with specific characteristics. There is a long-standing tradition of describing individual sonic booms by the amplitude of the shock waves, in pounds per square foot (psf). This is particularly relevant when assessing structural effects as opposed to loudness or cumulative community response. In this environmental analysis, sonic booms are quantified by either dB or psf, as appropriate for the particular impact being assessed.

Frequency. The normal human ear can hear frequencies from about 20 Hz to about 20,000 Hz. It is most sensitive to sounds in the 1,000 to 4,000 Hz range. When measuring community response to noise, it is common to adjust the frequency content of the measured sound to correspond to the frequency sensitivity of the human ear. This adjustment is called A-weighting (American National Standards Institute 1988). Sound levels that have been so adjusted are referred to as A-weighted sound levels.

The audible quality of high thrust engines in modern military combat aircraft can be somewhat different than other aircraft, including (at high throttle settings) the characteristic nonlinear crackle of high thrust engines. The spectral characteristics of various noises are accounted for by A-weighting, which approximates the response of the human ear but does not necessarily account for quality. There are other, more detailed, weighting factors that have been applied to sounds. In the 1950s and 1960s, when noise from civilian jet aircraft became an issue, substantial research was performed to determine what characteristics of jet noise were a problem. The metrics Perceived Noise Level and Effective Perceived Noise Level were developed. These accounted for nonlinear behavior of hearing and the importance of low frequencies at high levels, and for many years airport/airbase noise contours were presented in terms of Noise Exposure Forecast, which was based on Perceived Noise Level and Effective Perceived Noise Level. In the 1970s, however, it was realized that the primary intrusive aspect of aircraft noise was the high noise level, a factor which is well represented by A-weighted levels and day-night average sound level (DNL). The refinement of Perceived Noise Level, Effective Perceived Noise Level, and Noise Exposure Forecast was not significant in protecting the public from noise.

There has been continuing research on noise metrics and the importance of sound quality, sponsored by the Department of Defense (DoD) for military aircraft noise and by the Federal Aviation Administration (FAA) for civil aircraft noise. The metric L_{dnmr}, which is described later and accounts for the increased annoyance of rapid onset rate of sound, is a product of this long-term research.

The amplitude of A-weighted sound levels is measured in dB. It is common for some noise analysts to denote the unit of A-weighted sounds by dBA. As long as the use of A-weighting is understood, there is no difference between dB or dBA: it is only important that the use of A-weighting be made clear. In this environmental analysis, A-weighted sound levels are reported as dB.

A-weighting is appropriate for continuous sounds, which are perceived by the ear. Impulsive sounds, such as sonic booms, are perceived by more than just the ear. When experienced indoors, there can be secondary noise from rattling of the building. Vibrations may also be felt. C-weighting (American National Standards Institute 1988) is applied to such sounds. This is a frequency weighting that is relatively flat over the range of human hearing (about 20 Hz to 20,000 Hz) that rolls off above 5,000 Hz and below 50 Hz. In this study, C-weighted sound levels are used for the assessment of sonic booms and other impulsive sounds. As with A-weighting, the unit is dB, but dBC is sometimes used for clarity. In this study, sound levels are reported in both A-weighting and C-weighting dBs, and C-weighted metrics are denoted when used.

Time Averaging. Sound pressure of a continuous sound varies greatly with time, so it is customary to deal with sound levels that represent averages over time. Levels presented as instantaneous (i.e., as might be read from the display of a sound level meter) are based on averages of sound energy over either 1/8 second (fast) or 1 second (slow). The formal definitions of fast and slow levels are somewhat complex, with details that are important to the makers and users of instrumentation. They may, however, be thought of as levels corresponding to the root-mean-square sound pressure measured over the 1/8-second or 1-second periods.

The most common uses of the fast or slow sound level in environmental analysis is in the discussion of the maximum sound level that occurs from the action, and in discussions of typical sound levels. Figure C-1 is a chart of A-weighted sound levels from typical sounds. Some (air conditioner, vacuum cleaner) are continuous sounds whose levels are constant for some time. Some (automobile, heavy truck) are the maximum sound during a vehicle passby. Some (urban daytime, urban nighttime) are averages over some extended period. A variety of noise metrics have been developed to describe noise over different time periods. These are described in Section 1.2.

1.2 Noise Metrics

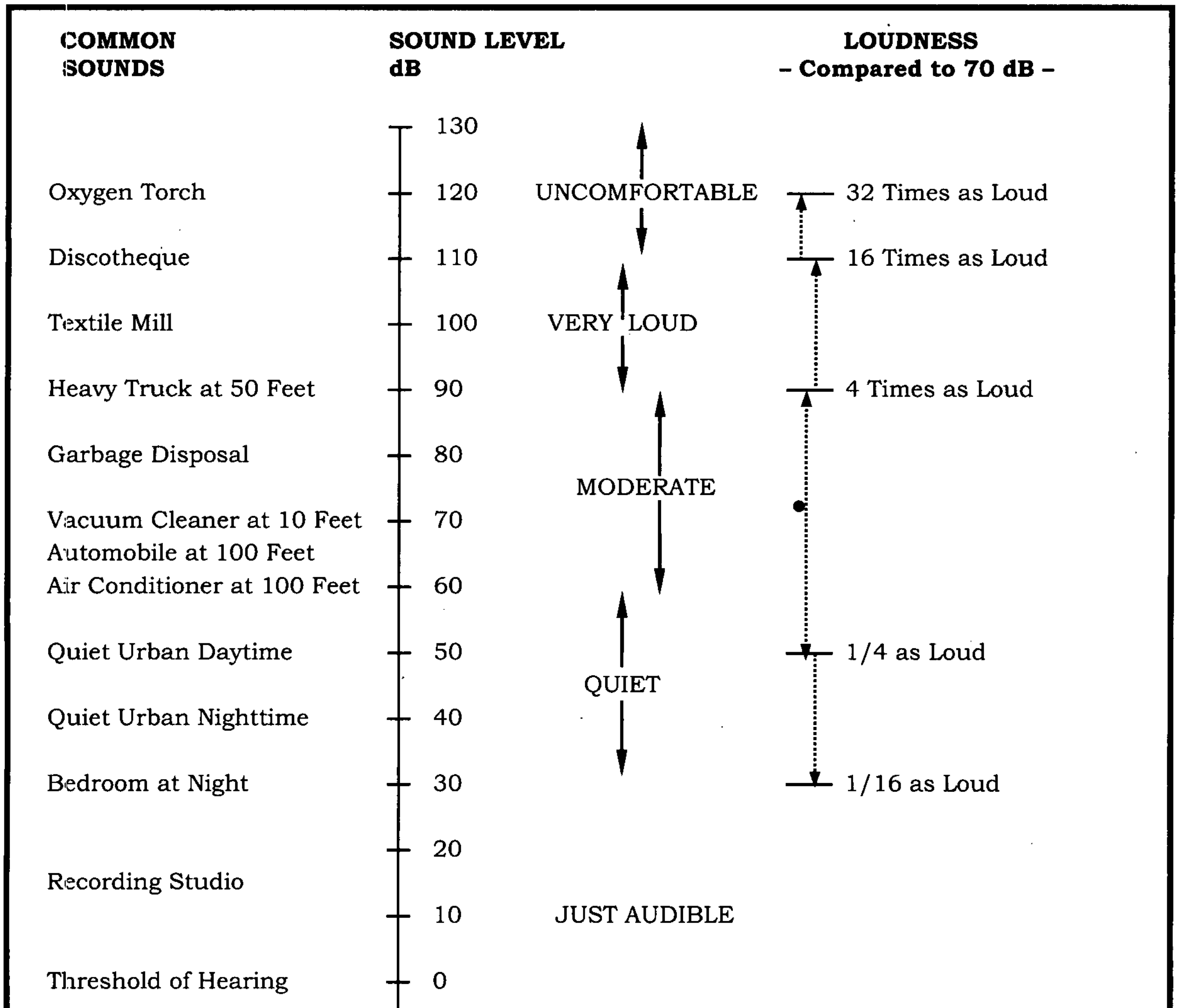
Maximum Sound Level

The highest A-weighted sound level measured during a single event in which the sound level changes value as time goes on (e.g., an aircraft overflight) is called the maximum A-weighted sound level or maximum sound level, for short. It is usually abbreviated by ALM, L_{max}, or L_{Amax}. The maximum sound level is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleeping, or other common activities. Table C-1 reflects L_{max} values for typical aircraft associated with this assessment operating at the indicated flight profiles and power settings.

Table C-1 Representative Maximum Sound Levels (L_{max})

Aircraft (engine type)	*Power Setting*	*Power Unit*	*L_{max} Values (in dBA) At Varying Distances (In Feet)* 500	1,000	2,000	5,000	10,000
Takeoff/Departure Operations (at 300 knots airspeed)							
A-10A	6200	NF	99.9	91.7	82.2	68.2	57.8
B-1	97.5%	RPM	126.5	118.3	109.9	98.3	88.7
F-15 (P220)	90%	NC	111.4	104.3	96.6	85	74.7
F-16 (P229)	93%	NC	113.7	106.2	98.1	86.1	75.7
F-22	100%	ETR	119.7	112.4	104.6	93	82.9
Landing/Arrival Operations (at 160 knots airspeed)							
A-10A	5225	NF	97	88.9	78.8	60.2	46.4
B-1	90%	RPM	98.8	91.9	84.5	72.8	62
F-15 (P220)	75%	NC	88.5	81.6	74.3	63.2	53.4
F-16 (P229)	83.5%	NC	92.6	85.5	77.8	66.1	55.6
F-22	43%	ETR	111.3	103.9	95.9	83.9	73.1

Engine Unit of Power: RPM—Revolutions Per Minute; ETR—Engine Thrust Ratio; NC—Engine Core RPM; and NF—Engine Fan RPM. *Source*: SELCalc2 (Flyover Noise Calculator), Using Noisemap 6/7 and Maximum Omega10 Result as the defaults.



Source: *Handbook of Noise Control*, C.M. Harris, Editor, McGraw-Hill Book Co., 1979, and FICON 1992.

Figure C-1 Typical A-Weighted Sound Levels of Common Sounds

Peak Sound Level

For impulsive sounds, the true instantaneous sound pressure is of interest. For sonic booms, this is the peak pressure of the shock wave, as described in Section 3.2 of this appendix. This pressure is usually presented in physical units of pounds per square foot. Sometimes it is represented on the decibel scale, with symbol Lpk. Peak sound levels do not use either A or C weighting.

Sound Exposure Level

Individual time-varying noise events have two main characteristics: a sound level that changes throughout the event and a period of time during which the event is heard. Although the maximum sound level, described above, provides some measure of the intrusiveness of the event, it alone does not completely describe the total event. The period of time during which the sound is heard is also significant. The Sound Exposure Level (abbreviated SEL or L_{AE} for A-weighted sounds) combines both of these characteristics into a single metric.

SEL is a composite metric that represents both the intensity of a sound and its duration. Mathematically, the mean square sound pressure is computed over the duration of the event, then multiplied by the duration in seconds, and the resultant product is turned into a sound level. It does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event. It has been well established in the scientific community that SEL measures this impact much more reliably than just the maximum sound level. Table C-2 shows SEL values corresponding to the aircraft and power settings reflected in Table C-1.

Table C-2 Representative Sound Exposure Levels (SEL)

Aircraft (engine type)	*Power Setting*	*Power Unit*	*SEL Values (in dBA) At Varying Distances (In Feet)*				
			500	*1,000*	*2,000*	*5,000*	*10,000*
Takeoff/Departure Operations (at 300 knots airspeed)							
A-10A	6200	NF	102.6	96.2	88.5	76.9	68.3
B-1	97.5%	RPM	129.5	123.1	116.5	107.3	99.3
F-15 (P220)	90%	NC	117.3	112	106.1	97	88.4
F-16 (P229)	93%	NC	116.5	110.8	104.6	95	86.3
F-22	100%	ETR	124.2	118.7	112.7	103.5	95.2
Landing/Arrival Operations (at 160 knots airspeed)							
A-10A	5225	NF	97.9	91.5	83.3	67	55
B-1	90%	RPM	103.4	98.3	92.7	83.4	74.4
F-15 (P220)	75%	NC	94.2	89.2	83.6	74.9	66.9
F-16 (P229)	83.5%	NC	97.4	92.1	86.3	76.9	68.2
F-22	43%	ETR	114.9	109.3	103.1	93.5	84.5

Engine Unit of Power: RPM—Revolutions Per Minute; ETR—Engine Thrust Ratio; NC—Engine Core RPM; and NF—Engine Fan RPM. *Source*: SELCalc2 (Flyover Noise Calculator), Using Noisemap 6/7 and Maximum Omega10 Result as the defaults.

Because the SEL and the maximum sound level are both used to describe single events, there is sometimes confusion between the two, so the specific metric used should be clearly stated.

SEL can be computed for C-weighted levels (appropriate for impulsive sounds), and the results denoted CSEL or L_{CE}. SEL for A-weighted sound is sometimes denoted ASEL. Within this study, SEL is used for A-weighted sounds and CSEL for C-weighted.

Equivalent Sound Level

For longer periods of time, total sound is represented by the equivalent continuous sound pressure level (L_{eq}). L_{eq} is the average sound level over some time period (often an hour or a day, but any explicit time span can be specified), with the averaging being done on the same energy basis as used for SEL. SEL and L_{eq} are closely related, with L_{eq} being SEL over some time period normalized by that time.
Just as SEL has proven to be a good measure of the noise impact of a single event, L_{eq} has been established to be a good measure of the impact of a series of events during a given time period. Also, while Leq is defined as an average, it is effectively a sum over that time period and is, thus, a measure of the cumulative impact of noise.

Day-Night Average Sound Level

Noise tends to be more intrusive at night than during the day. This effect is accounted for by applying a 10 dB penalty to events that occur after 10 pm and before 7 am. If L_{eq} is computed over a 24-hour period with this nighttime penalty applied, the result is the DNL. DNL is the community noise metric recommended by the USEPA (United States Environmental Protection Agency [USEPA] 1974) and has been adopted by most federal agencies (Federal Interagency Committee on Noise 1992). It has been well established that DNL correlates well with long-term community response to noise (Schultz 1978; Finegold *et al.* 1994). This correlation is presented in Section 1.3 of this appendix.

DNL accounts for the total, or cumulative, noise impact at a given location, and for this reason is often referred to as a "cumulative" metric.

It was noted earlier that, for impulsive sounds, such as sonic booms, C-weighting is more appropriate than A-weighting. The day-night average sound level computed with C-weighting is denoted CDNL or L_{Cdn}. This procedure has been standardized, and impact interpretive criteria similar to those for DNL have been developed (Committee on Hearing, Bioacoustics and Biomechanics 1981).

Onset-Adjusted Monthly Day-Night Average Sound Level

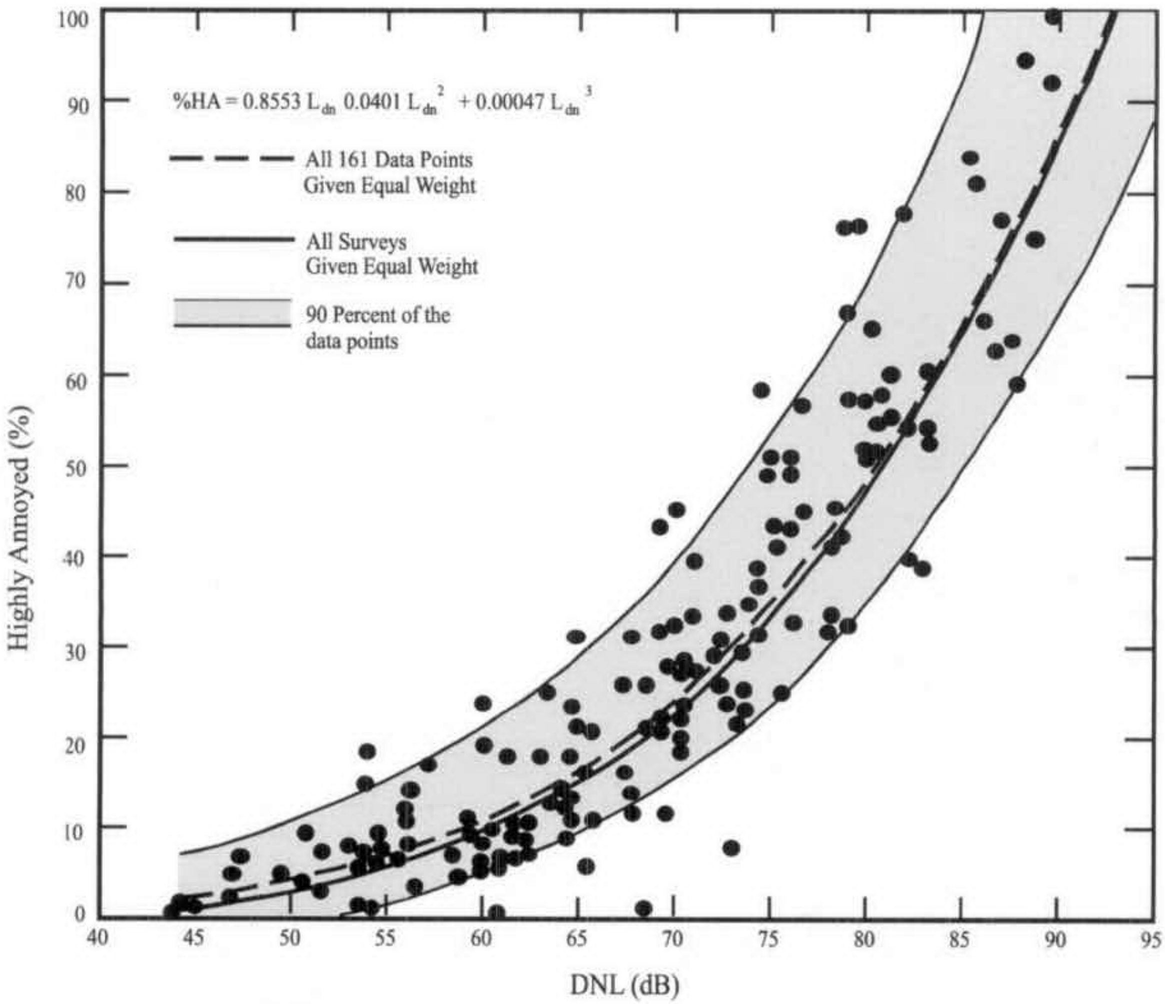
Aircraft operations in military training airspace generate a noise environment somewhat different from other community noise environments. Overflights are sporadic, occurring at random times and varying from day to day and week to week. This situation differs from most community noise environments, in which noise tends to be continuous or patterned. Individual military overflight events also differ from typical community noise events in that noise from a low-altitude, high-airspeed flyover can have a rather sudden onset.

To represent these differences, the conventional DNL metric is adjusted to account for the "surprise" effect of the sudden onset of aircraft noise events on humans (Plotkin *et al.* 1987; Stusnick *et al.* 1992; Stusnick *et al.* 1993). For aircraft exhibiting a rate of increase in sound level (called onset rate) of from 15 to 150 dB per second, an adjustment or penalty ranging from 0 to 11 dB is added to the normal SEL. Onset rates above 150 dB per second require an 11 dB penalty, while onset rates below 15 dB per second require no adjustment. The DNL is then determined in the same manner as for conventional aircraft noise events and is designated as Onset-Rate Adjusted Day-Night Average Sound Level (abbreviated L_{dnmr}). Because of the irregular occurrences of aircraft operations, the number of average daily operations is determined by using the calendar month with the highest number of operations. The monthly average is denoted L_{dnmr}. Noise levels are calculated the same way for both DNL and L_{dnmr}. L_{dnmr} is interpreted by the same criteria as used for DNL.

1.3 Noise Impact

Community Reaction

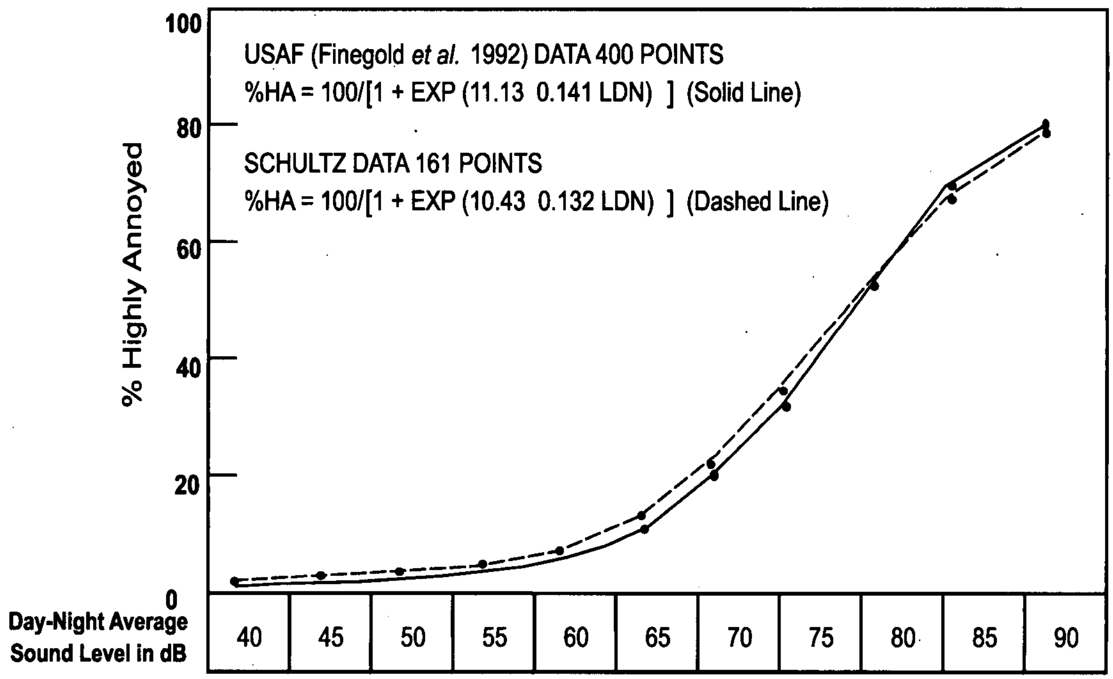
Studies of long-term community annoyance to numerous types of environmental noise show that DNL correlates well with the annoyance. Schultz (1978) showed a consistent relationship between DNL and annoyance. Shultz's original curve fit (Figure C-2) shows that there is a remarkable consistency in results of attitudinal surveys which relate the percentages of groups of people who express various degrees of annoyance when exposed to different DNL.



Source: Schultz 1978

Figure C-2 Community Surveys of Noise Annoyance

A more recent study has reaffirmed this relationship (Fidell *et al.* 1991). Figure C-3 (Federal Interagency Committee on Noise 1992) shows an updated form of the curve fit (Finegold *et al.* 1994) in comparison with the original. The updated fit, which does not differ substantially from the original, is the current preferred form. In general, correlation coefficients of 0.85 to 0.95 are found between the percentages of groups of people highly annoyed and the level of average noise exposure. The correlation coefficients for the annoyance of individuals are relatively low, however, on the order of 0.5 or less. This is not surprising, considering the varying personal factors that influence the manner in which individuals react to noise. Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using DNL.



Calculated %HA Points											
USAF	0.41	0.831	1.66	3.31	6.48	12.29	22.1	36.47	53.74	70.16	82.64
SCHULTZ	0.576	1.11	2.12	4.03	7.52	13.59	23.32	37.05	53.25	68.78	81

Figure C-3 Response of Communities to Noise; Comparison of Original (Schultz 1978) and Current (Finegold *et al.* 1994) Curve Fits

As noted earlier for SEL, DNL does not represent the sound level heard at any particular time, but rather represents the total sound exposure. DNL accounts for the sound level of individual noise events, the duration of those events, and the number of events. Its use is endorsed by the scientific community (American National Standards Institute 1980, 1988, 2005; USEPA 1974; Federal Interagency Committee on Urban Noise 1980; Federal Interagency Committee on Noise 1992).

While DNL is the best metric for quantitatively assessing cumulative noise impact, it does not lend itself to intuitive interpretation by non-experts. Accordingly, it is common for environmental noise analyses to include other metrics for illustrative purposes. A general indication of the noise environment can be presented by noting the maximum sound levels which can occur and the number of times per day noise events will be loud enough to be heard. Use of other metrics as supplements to DNL has been endorsed by federal agencies (Federal Interagency Committee on Noise 1992).

The Schultz curve is generally applied to annual average DNL. In Section 1.2, L_{dnmr} was described and presented as being appropriate for quantifying noise in military airspace. The Schultz curve is used with L_{dnmr} as the noise metric. L_{dnmr} is always equal to or greater than DNL, so impact is generally higher than would have been predicted if the onset rate and busiest-month adjustments were not accounted for.

There are several points of interest in the noise-annoyance relation. The first is DNL of 65 dB. This is a level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities like aviation which do cause noise. Areas exposed to DNL above 65 dB are generally not considered suitable for residential use. The second is DNL of 55 dB, which was identified by USEPA as a level "...requisite to protect the public health and welfare with an adequate margin of safety," (USEPA 1974) which is essentially a level below which adverse impact is not expected. The third is DNL of 75 dB. This is the lowest level at which adverse health effects could be credible (USEPA 1974). The very high annoyance levels correlated with DNL of 75 dB make such areas unsuitable for residential land use.

Sonic boom exposure is measured by C-weighting, with the corresponding cumulative metric being CDNL. Correlation between CDNL and annoyance has been established, based on community reaction to impulsive sounds (Committee on Hearing, Bioacoustics and Biomechanics 1981). Values of the C-weighted equivalent to the Schultz curve are different than that of the Schultz curve itself. Table C-3 shows the relation between annoyance, DNL, and CDNL.

Table C-3 Relation Between Annoyance, DNL and CDNL

DNL	*% Highly Annoyed*	*CDNL*
45	0.83	42
50	1.66	46
55	3.31	51
60	6.48	56
65	12.29	60
70	22.10	65

Interpretation of CDNL from impulsive noise is accomplished by using the CDNL versus annoyance values in Table C-3. CDNL can be interpreted in terms of an "equivalent annoyance" DNL. For example, CDNL of 52, 61, and 69 dB are equivalent to DNL of 55, 65, and 75 dB, respectively. If both continuous and impulsive noise occurs in the same area, impacts are assessed separately for each.

Land Use Compatibility

As noted above, the inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, when a community is considered as a whole, its overall reaction to noise can be represented with a high degree of confidence. As described above, the best noise exposure metric for this correlation is the DNL or L_{dnmr} for military overflights. Impulsive noise can be assessed by relating CDNL to an "equivalent annoyance" DNL, as outlined in Section 1.3.1.

In June 1980, an ad hoc Federal Interagency Committee on Urban Noise published guidelines (Federal Interagency Committee on Urban Noise 1980) relating DNL to compatible land uses. This committee was composed of representatives from DoD, Transportation, and Housing and Urban Development; USEPA; and the Veterans Administration. Since the issuance of these guidelines, federal agencies have generally adopted these guidelines for their noise analyses.

Following the lead of the committee, DoD and FAA adopted the concept of land-use compatibility as the accepted measure of aircraft noise effect. The FAA included the committee's guidelines in the Federal Aviation Regulations (United States Department of Transportation 1984). These guidelines are reprinted in Table C-4, along with the explanatory notes included in the regulation. Although these guidelines are not mandatory (note the footnote "*" in the table), they provide the best means for determining noise impact in airport communities. In general, residential land uses normally are not compatible with outdoor DNL values above 65 dB, and the extent of land areas and populations exposed to DNL of 65 dB and higher provides the best means for assessing the noise impacts of alternative aircraft actions. In some cases a change in noise level, rather than an absolute threshold, may be a more appropriate measure of impact.

Table C-4 Land-Use Compatibility With Yearly Day-Night Average Sound Levels

Land Use	Yearly Day-Night Average Sound Level (DNL) in Decibels					
	Below 65	65–70	70–75	75–80	80–85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoria, and concert halls	Y	25	30	N	N	N
Government services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail—building materials, hardware, and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade—general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts, and camps	Y	Y	Y	N	N	N
Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N

Numbers in parentheses refer to notes.

* The designations contained in this table do not constitute a federal determination that any use of land covered by the program is acceptable or unacceptable under federal, state, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise-compatible land uses.

KEY TO TABLE C-4

Y (YES) = Land Use and related structures compatible without restrictions.

N (No) = Land Use and related structures are not compatible and should be prohibited.

NLR = Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.

25, 30, or 35 = Land Use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structures.

NOTES FOR TABLE C-4

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor-to-indoor NLR of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide an NLR of 20 dB; thus the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year-round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

(3) Measures to achieve NLR 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

(4) Measures to achieve NLR 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

(5) Land-use compatible provided special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

2.0 NOISE EFFECTS

The discussion in Section 1.3 presents the global effect of noise on communities. The following sections describe particular noise effects.

2.1 Hearing Loss

Noise-induced hearing loss is probably the best defined of the potential effects of human exposure to excessive noise. Federal workplace standards for protection from hearing loss allow a time-average level of 90 dB over an 8-hour work period, or 85 dB averaged over a 16-hour period. Even the most protective criterion (no measurable hearing loss for the most sensitive portion of the population at the ear's most sensitive frequency, 4,000 Hz, after a 40-year exposure suggests a time-average sound level of 70 dB over a 24-hour period (USEPA 1974). Since it is unlikely that airport neighbors will remain outside their homes 24 hours per day for extended periods of time, there is little possibility of hearing loss below a DNL of 75 dB, and this level is extremely conservative.

2.2 Nonauditory Health Effects

Nonauditory health effects of long-term noise exposure, where noise may act as a risk factor, have not been found to occur at levels below those protective against noise-induced hearing loss, described above. Most studies attempting to clarify such health effects have found that noise exposure levels established for hearing protection will also protect against any potential nonauditory health effects, at least in workplace conditions. The best scientific summary of these findings is contained in the lead paper at the National Institutes of Health Conference on Noise and Hearing Loss, held on January 22–24, 1990, in Washington, D.C., which states "The nonauditory effects of chronic noise exposure, when noise is suspected to act as one of the risk factors in the development of hypertension, cardiovascular disease, and other nervous disorders, have never been proven to occur as chronic manifestations at levels below these criteria (an average of 75 dBA for complete protection against hearing loss for an eight-hour day)" (von Gierke 1990; parenthetical wording added for clarification). At the International Congress (1988) on Noise as a Public Health Problem, most studies attempting to clarify such health effects did not find them at levels below the criteria protective of noise-induced hearing loss; and even above these criteria, results regarding such health effects were ambiguous.

Consequently, it can be concluded that establishing and enforcing exposure levels protecting against noise-induced hearing loss would not only solve the noise-induced hearing loss problem but also any potential nonauditory health effects in the work place.

Although these findings were directed specifically at noise effects in the work place, they are equally applicable to aircraft noise effects in the community environment. Research studies regarding the nonauditory health effects of aircraft noise are ambiguous, at best, and often contradictory. Yet, even those studies which purport to find such health effects use time-average noise levels of 75 dB and higher for their research.

For example, in an often-quoted paper, two University of California at Los Angeles researchers found a relation between aircraft noise levels under the approach path to Los Angeles International Airport and increased mortality rates among the exposed residents by using an average noise exposure level greater than 75 dB for the "noise-exposed" population (Meecham and Shaw 1979). Nevertheless, three other University of California at Los Angeles professors analyzed those same data and found no relation between noise exposure and mortality rates (Frerichs *et al.* 1980).

As a second example, two other University of California at Los Angeles researchers used this same population near Los Angeles International Airport to show a higher rate of birth defects during the period of 1970 to 1972 when compared with a control group residing away from the airport (Jones and Tauscher 1978). Based on this report, a separate group at the United States Centers for Disease Control performed a more thorough study of populations near Atlanta's Hartsfield International Airport for 1970 to 1972 and found no relation in their study of 17 identified categories of birth defects to aircraft noise levels above 65 dB (Edmonds 1979).

A recent review of health effects, prepared by a Committee of the Health Council of The Netherlands (Committee of the Health Council of the Netherlands 1996), analyzed currently available published information on this topic. The committee concluded that the threshold for possible long-term health effects was a 16-hour (6:00 a.m. to 10:00 p.m.) L_{eq} of 70 dB. Projecting this to 24 hours and applying the 10 dB nighttime penalty used with DNL, this corresponds to DNL of about 75 dB. The study also affirmed the risk threshold for hearing loss, as discussed earlier.

In summary, there is no scientific basis for a claim that potential health effects exist for aircraft time-average sound levels below 75 dB.

2.3 Annoyance

The primary effect of aircraft noise on exposed communities is one of annoyance. Noise annoyance is defined by the USEPA as any negative subjective reaction on the part of an individual or group (USEPA 1974). As noted in the discussion of DNL above, community annoyance is best measured by that metric.

Because the USEPA Levels Document (USEPA 1974) identified DNL of 55 dB as ". . . requisite to protect public health and welfare with an adequate margin of safety," it is commonly assumed that 55 dB should be adopted as a criterion for community noise analysis. From a noise exposure perspective, that would be an ideal selection. However, financial and technical resources are generally not available to achieve that goal. Most agencies have identified DNL of 65 dB as a criterion which protects those most impacted by noise, and which can often be achieved on a practical basis (Federal Interagency Committee on Noise 1992). This corresponds to about 12 percent of the exposed population being highly annoyed. Although DNL of 65 dB is widely used as a benchmark for significant noise impact, and is often an acceptable compromise, it is not a statutory limit, and it is appropriate to consider other thresholds in particular cases.

In this analysis, no specific threshold is used. The noise in the affected environment is evaluated on the basis of the information presented in this appendix and in the body of the environmental analysis.

Community annoyance from sonic booms is based on CDNL, as discussed in Section 1.3. These effects are implicitly included in the "equivalent annoyance" CDNL values in Table C-3, since those were developed from actual community noise impact.

2.4 Speech Interference

Speech interference associated with aircraft noise is a primary cause of annoyance to individuals on the ground. The disruption of routine activities in the home, such as radio or television listening, telephone use, or family conversation, gives rise to frustration and irritation. The quality of speech communication is also important in classrooms, offices, and industrial settings and can cause fatigue and vocal strain in those who attempt to communicate over the noise. Research has shown that the use of the SEL metric will measure speech interference successfully, and that a SEL exceeding 65 dB will begin to interfere with speech communication.

2.5 Sleep Interference

Sleep interference is another source of annoyance associated with aircraft noise. This is especially true because of the intermittent nature and content of aircraft noise, which is more disturbing than continuous noise of equal energy and neutral meaning.

Sleep interference may be measured in either of two ways. "Arousal" represents actual awakening from sleep, while a change in "sleep stage" represents a shift from one of four sleep stages to another stage of lighter sleep without actual awakening. In general, arousal requires a somewhat higher noise level than does a change in sleep stage.

An analysis sponsored by the Air Force summarized 21 published studies concerning the effects of noise on sleep (Pearsons *et al.* 1989). The analysis concluded that a lack of reliable in-home studies, combined with large differences among the results from the various laboratory studies, did not permit development of an acceptably accurate assessment procedure. The noise events used in the laboratory studies and in contrived in-home studies were presented at much higher rates of occurrence than would normally be experienced. None of the laboratory studies were of sufficiently long duration to determine any effects of habituation, such as that which would occur under normal community conditions. A recent extensive study of sleep interference in people's own homes (Ollerhead 1992) showed very little disturbance from aircraft noise.

There is some controversy associated with the recent studies, so a conservative approach should be taken in judging sleep interference. Based on older data, the USEPA identified an indoor DNL of 45 dB as necessary to protect against sleep interference (USEPA 1974). Assuming a very conservative structural noise insulation of 20 dB for typical dwelling units, this corresponds to an outdoor DNL of 65 dB as minimizing sleep interference.

A 1984 publication reviewed the probability of arousal or behavioral awakening in terms of SEL (Kryter 1984). Figure C-4, extracted from Figure 10.37 of Kryter (1984), indicates that an indoor SEL of 65 dB or lower should awaken less than 5 percent of those exposed. These results do not include any habituation over time by sleeping subjects. Nevertheless, this provides a reasonable guideline for assessing sleep interference and corresponds to similar guidance for speech interference, as noted above.

2.6 Noise Effects on Domestic Animals and Wildlife

Animal species differ greatly in their responses to noise. Each species has adapted, physically and behaviorally, to fill its ecological role in nature, and its hearing ability usually reflects that role. Animals rely on their hearing to avoid predators, obtain food, and communicate with and attract other members of their species. Aircraft noise may mask or interfere with these functions. Secondary effects may include nonauditory effects similar to those exhibited by humans: stress, hypertension, and other nervous disorders. Tertiary effects may include interference with mating and resultant population declines.

2.7 Noise Effects on Structures

Subsonic Aircraft Noise

Normally, the most sensitive components of a structure to airborne noise are the windows and, infrequently, the plastered walls and ceilings. An evaluation of the peak sound pressures impinging on the structure is normally sufficient to determine the possibility of damage. In general, at sound levels above 130 dB, there is the possibility of the excitation of structural component resonance. While certain frequencies (such as 30 Hz for window breakage) may be of more concern than other frequencies, conservatively, only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components (National Research Council/National Academy of Sciences 1977).

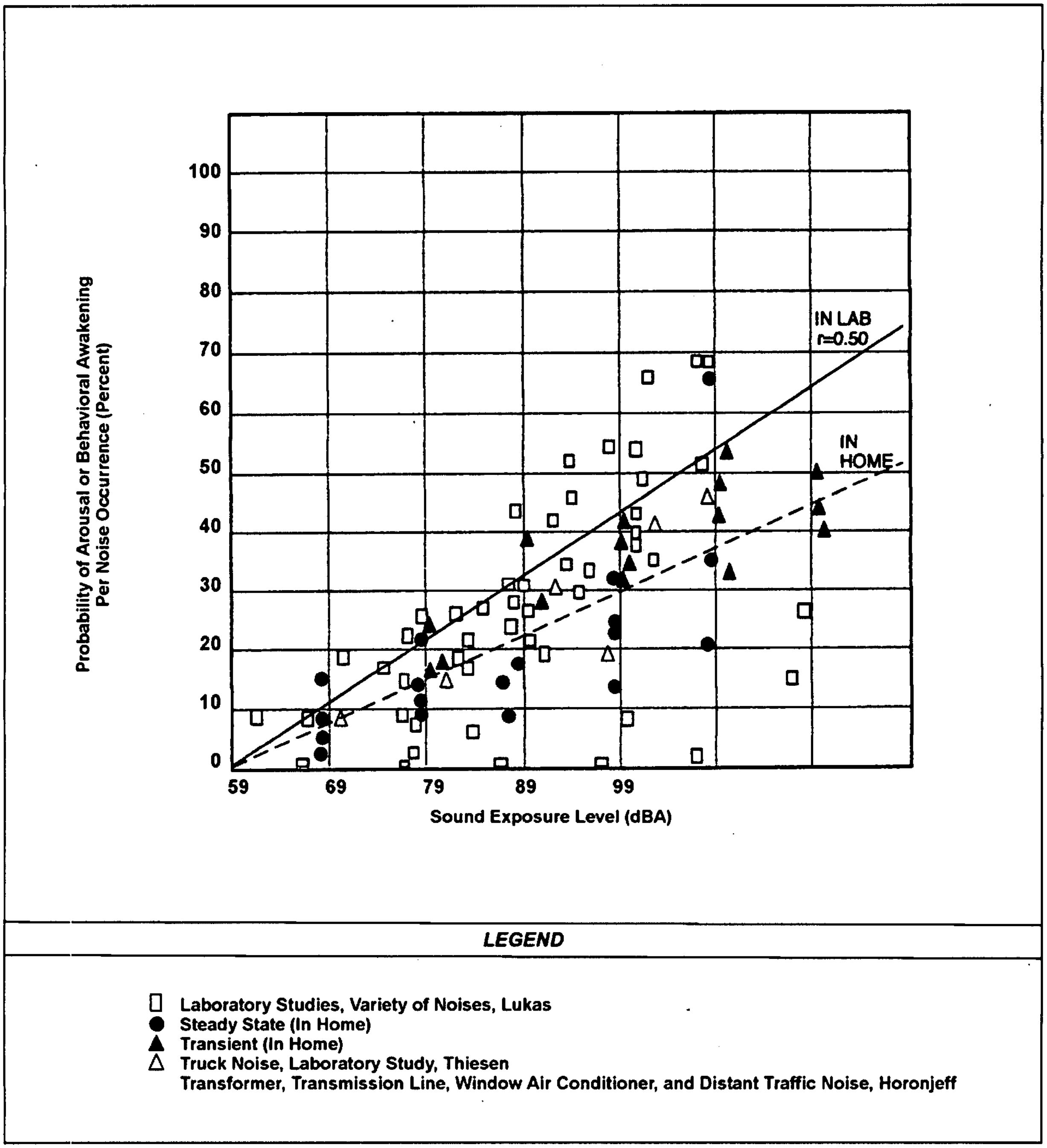


Figure C-4 Probability of Arousal or Behavioral Awakening in Terms of Sound Exposure Level

A study directed specifically at low-altitude, high-speed aircraft showed that there is little probability of structural damage from such operations (Sutherland 1989). One finding in that study is that sound levels at damaging frequencies (e.g., 30 Hz for window breakage or 15 to 25 Hz for whole-house response) are rarely above 130 dB.

Noise-induced structural vibration may also cause annoyance to dwelling occupants because of induced secondary vibrations, or "rattle," of objects within the dwelling, such as hanging pictures, dishes, plaques, and bric-a-brac. Window panes may also vibrate noticeably when exposed to high levels of airborne noise, causing homeowners to fear breakage. In general, such noise-induced vibrations occur at sound levels above those considered normally incompatible with residential land use. Thus assessments of noise exposure levels for compatible land use should also be protective of noise-induced secondary vibrations.

Sonic Booms

Sonic booms are commonly associated with structural damage. Most damage claims are for brittle objects, such as glass and plaster. Table C-5 summarizes the threshold of damage that might be expected at various overpressures. There is a large degree of variability in damage experience, and much damage depends on the pre-existing condition of a structure. Breakage data for glass, for example, spans a range of two to three orders of magnitude at a given overpressure. At 1 psf, the probability of a window breaking ranges from one in a billion (Sutherland 1990) to one in a million (Hershey and Higgins 1976). These damage rates are associated with a combination of boom load and glass condition. At 10 psf, the probability of breakage is between one in a hundred and one in a thousand. Laboratory tests of glass (White 1972) have shown that properly installed window glass will not break at overpressures below 10 psf, even when subjected to repeated booms, but in the real world glass is not in pristine condition.

Table C-5 Possible Damage to Structures From Sonic Booms

Sonic Boom Overpressure Nominal (psf)	*Type of Damage*	*Item Affected*
0.5 - 2	Plaster	Fine cracks; extension of existing cracks; more in ceilings; over door frames; between some plaster boards.
	Glass	Rarely shattered; either partial or extension of existing.
	Roof	Slippage of existing loose tiles/slates; sometimes new cracking of old slates at nail hole.
	Damage to outside walls	Existing cracks in stucco extended.
	Bric-a-brac	Those carefully balanced or on edges can fall; fine glass, such as large goblets, can fall and break.
	Other	Dust falls in chimneys.
2 - 4	Glass, plaster, roofs, ceilings	Failures show that would have been difficult to forecast in terms of their existing localized condition. Nominally in good condition.
4 - 10	Glass	Regular failures within a population of well-installed glass; industrial as well as domestic greenhouses.
	Plaster	Partial ceiling collapse of good plaster; complete collapse of very new, incompletely cured, or very old plaster.
	Roofs	High probability rate of failure in nominally good state, slurry-wash; some chance of failures in tiles on modern roofs; light roofs (bungalow) or large area can move bodily.
	Walls (out)	Old, free standing, in fairly good condition can collapse.

Table C-5 Possible Damage to Structures From Sonic Booms		
	Walls (in)	Inside ("party") walls known to move at 10 psf.
Greater than 10	Glass	Some good glass will fail regularly to sonic booms from the same direction. Glass with existing faults could shatter and fly. Large window frames move.
	Plaster	Most plaster affected.
	Ceilings	Plaster boards displaced by nail popping.
	Roofs	Most slate/slurry roofs affected, some badly; large roofs having good tile can be affected; some roofs bodily displaced causing gale-end and will-plate cracks; domestic chimneys dislodged if not in good condition.
	Walls	Internal party walls can move even if carrying fittings such as hand basins or taps; secondary damage due to water leakage.
	Bric-a-brac	Some nominally secure items can fall; e.g., large pictures, especially if fixed to party walls.

Source: Haber and Nakaki 1989

Damage to plaster occurs at similar ranges to glass damage. Plaster has a compounding issue in that it will often crack due to shrinkage while curing, or from stresses as a structure settles, even in the absence of outside loads. Sonic boom damage to plaster often occurs when internal stresses are high from these factors.

Some degree of damage to glass and plaster should thus be expected whenever there are sonic booms, but usually at the low rates noted above. In general, structural damage from sonic booms should be expected only for overpressures above 10 psf.

2.8 Noise Effects on Terrain

Subsonic Aircraft Noise

Members of the public often believe that noise from low-flying aircraft can cause avalanches or landslides by disturbing fragile soil or snow structures in mountainous areas. There are no known instances of such effects, and it is considered improbable that such effects will result from routine, subsonic aircraft operations.

Sonic Booms

In contrast to subsonic noise, sonic booms are considered to be a potential trigger for snow avalanches. Avalanches are highly dependent on the physical status of the snow, and do occur spontaneously. They can be triggered by minor disturbances, and there are documented accounts of sonic booms triggering avalanches. Switzerland routinely restricts supersonic flight during avalanche season.
Landslides are not an issue for sonic booms. There was one anecdotal report of a minor landslide from a sonic boom generated by the Space Shuttle during landing, but there is no credible mechanism or consistent pattern of reports.

2.9 Noise Effects on Historical and Archaeological Sites

Because of the potential for increased fragility of structural components of historical buildings and other historical sites, aircraft noise may affect such sites more severely than newer, modern structures. Again, there are few scientific studies of such effects to provide guidance for their assessment.

One study involved the measurements of sound levels and structural vibration levels in a superbly restored plantation house, originally built in 1795, and now situated approximately 1,500 feet from the centerline at the departure end of Runway 19L at Washington Dulles International Airport. These measurements were made in connection with the proposed scheduled operation of the supersonic Concorde airplane at Dulles (Wesler 1977). There was special concern for the building's windows, since roughly half of the 324 panes were original. No instances of structural damage were found. Interestingly, despite the high levels of noise during Concorde takeoffs, the induced structural vibration levels were actually less than those induced by touring groups and vacuum cleaning within the building itself.

As noted above for the noise effects of noise-induced vibrations on normal structures, assessments of noise exposure levels for normally compatible land uses should also be protective of historic and archaeological sites.

3.0 NOISE MODELING

3.1 Subsonic Aircraft Noise

An aircraft in subsonic flight generally emits noise from two sources: the engines and flow noise around the airframe. Noise generation mechanisms are complex and, in practical models, the noise sources must be based on measured data. The Air Force has developed a series of computer models and aircraft noise databases for this purpose. The models include NOISEMAP (Moulton 1992) for noise around airbases, and MR_NMAP (Lucas and Calamia 1996) for use in MOAs, ranges, and low-level training routes. These models use the NOISEFILE database developed by the Air Force. NOISEFILE data includes SEL and L_{Amax} as a function of speed and power setting for aircraft in straight flight.

Noise from an individual aircraft is a time-varying continuous sound. It is first audible as the aircraft approaches, increases to a maximum when the aircraft is near its closest point, then diminishes as it departs. The noise depends on the speed and power setting of the aircraft and its trajectory. The models noted above divide the trajectory into segments whose noise can be computed from the data in NOISEFILE. The contributions from these segments are summed.

MR_NMAP was used to compute noise levels in the airspace. The primary noise metric computed by MR_NMAP was L_{dnmr} averaged over each airspace. Supporting routines from NOISEMAP were used to calculate SEL and L_{Amax} for various flight altitudes and lateral offsets from a ground receiver position.

3.2 Sonic Booms

When an aircraft moves through the air, it pushes the air out of its way. At subsonic speeds, the displaced air forms a pressure wave that disperses rapidly. At supersonic speeds, the aircraft is moving too quickly for the wave to disperse, so it remains as a coherent wave. This wave is a sonic boom. When heard at the ground, a sonic boom consists of two shock waves (one associated with the forward part of the aircraft, the other with the rear part) of approximately equal strength and (for fighter aircraft) separated by 100 to 200 milliseconds. When plotted, this pair of shock waves and the expanding flow between them have the appearance of a capital letter "N," so a sonic boom pressure wave is usually called an "N-wave." An N-wave has a characteristic "bang-bang" sound that can be startling. Figure C-5 shows the generation and evolution of a sonic boom N-wave under the aircraft. Figure C-6 shows the sonic boom pattern for an aircraft in steady supersonic flight. The boom forms a cone that is said to sweep out a "carpet" under the flight track.

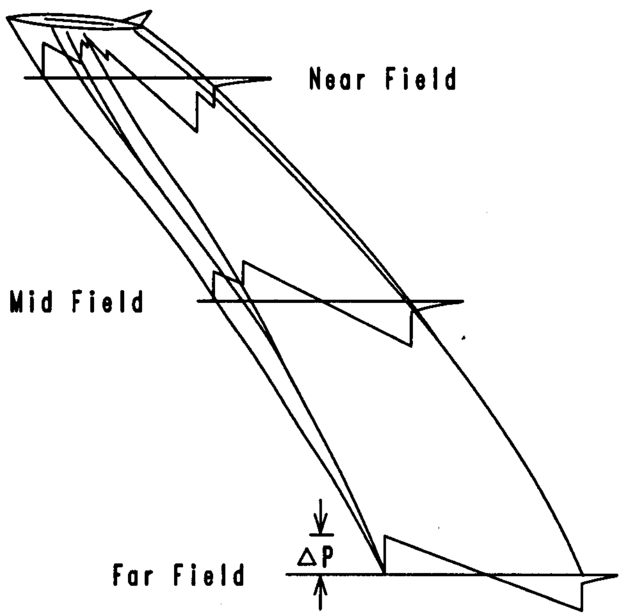


Figure C-5 Sonic Boom Generation and Evolution to N-Wave

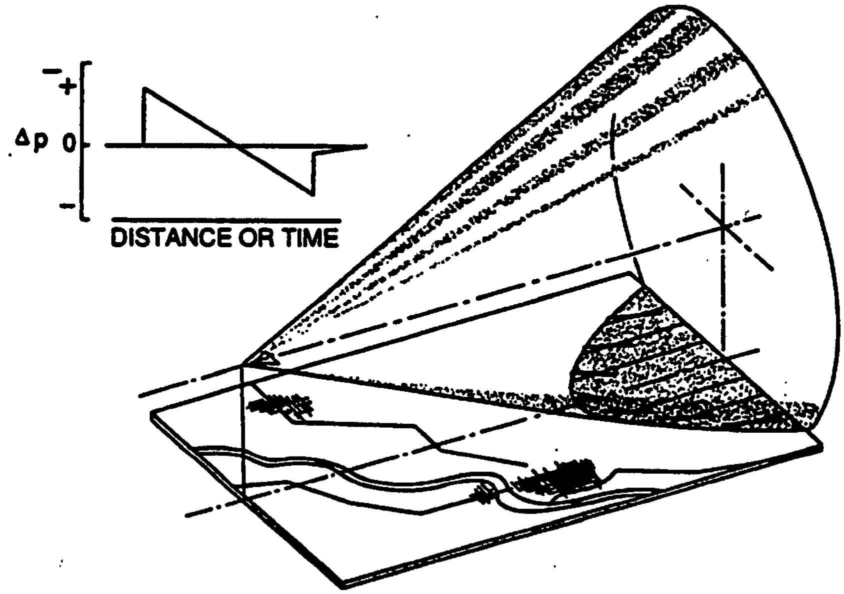


Figure C-6 Sonic Boom Carpet in Steady Flight

The complete ground pattern of a sonic boom depends on the size, shape, speed, and trajectory of the aircraft. Even for a nominally steady mission, the aircraft must accelerate to supersonic speed at the start, decelerate back to subsonic speed at the end, and usually change altitude. Figure C-7 illustrates the complexity of a nominal full mission.

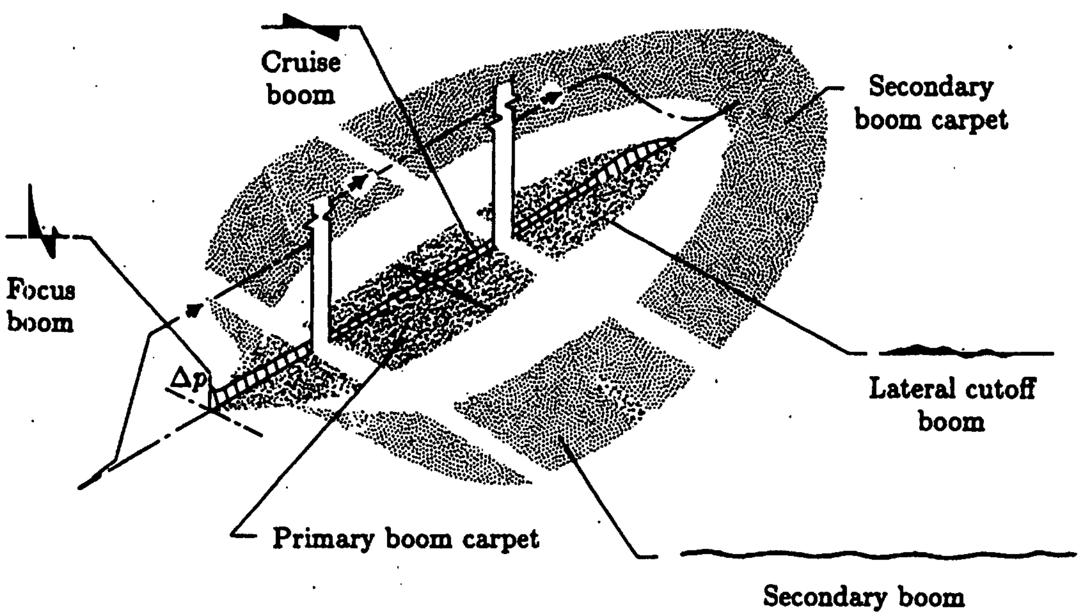


Figure C-7 Complex Sonic Boom Pattern for Full Mission

The Air Force's PCBoom4 computer program (Plotkin and Grandi 2002) can be used to compute the complete sonic boom footprint for a given single event, accounting for details of a particular maneuver.

Supersonic operations for the proposed action and alternatives are, however, associated with air combat training, which cannot be described in the deterministic manner that PCBoom4 requires. Supersonic events occur as aircraft approach an engagement, break at the end, and maneuver for advantage during the engagement. Long time cumulative sonic boom exposure, CDNL, is meaningful for this kind of environment.

Long-term sonic boom measurement projects have been conducted in four supersonic air combat training airspaces: White Sands, New Mexico (Plotkin *et al.* 1989); the eastern portion of the Goldwater Range, Arizona (Plotkin *et al.* 1992); the Elgin MOA at Nellis AFB, Nevada (Frampton *et al.* 1993); and the western portion of the Goldwater Range (Page *et al.* 1994). These studies included analysis of schedule and air combat maneuvering instrumentation data and supported development of the 1992 BOOMAP model (Plotkin *et al.* 1992). The current version of BOOMAP (Frampton *et al.* 1993; Plotkin 1996) incorporates results from all four studies. Because BOOMAP is directly based on long-term measurements, it implicitly accounts for such variables as maneuvers, statistical variations in operations, atmosphere effects, and other factors.

Figure C-8 shows a sample of supersonic flight tracks measured in the air combat training airspace at White Sands (Plotkin *et al.* 1989). The tracks fall into an elliptical pattern aligned with preferred engagement directions in the airspace. Figure C-9 shows the CDNL contours that were fit to six months of measured booms in that airspace. The subsequent measurement programs refined the fit, and demonstrated that the elliptical maneuver area is related to the size and shape of the airspace (Frampton *et al.* 1993). BOOMAP quantifies the size and shape of CDNL contours, and also numbers of booms per day, in air combat training airspaces. That model was used for prediction of cumulative sonic boom exposure in this analysis.

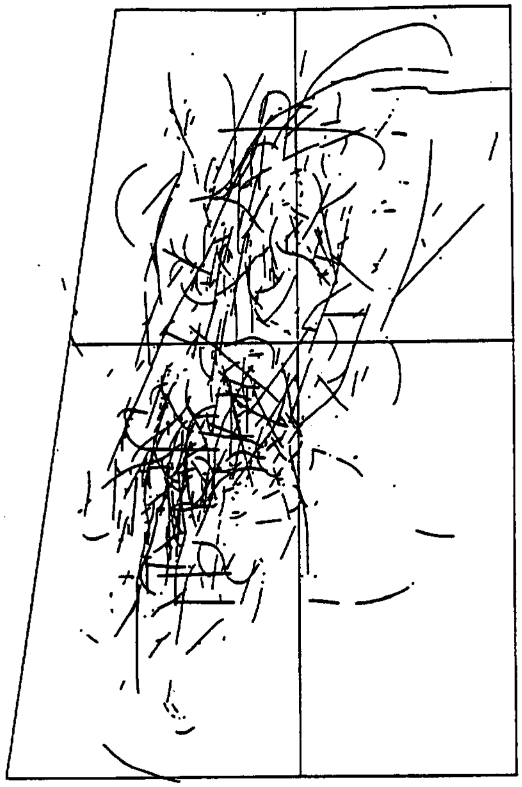


Figure C-8 Supersonic Flight Tracks in Supersonic Air Combat Training Airspace

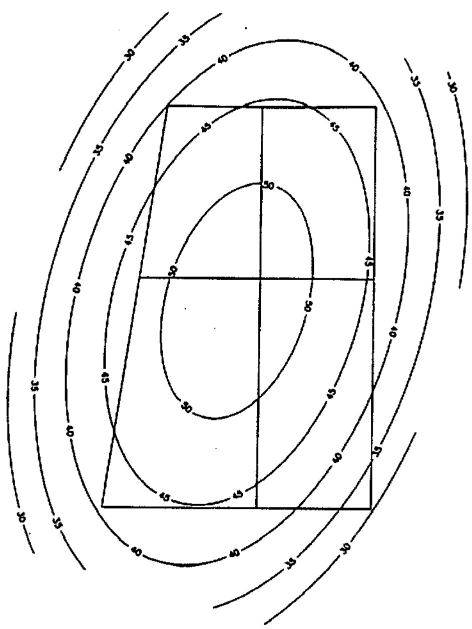


Figure C-9 Elliptical CDNL Contours in Supersonic Air Combat Training Airspace

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APPENDIX D
AIR QUALITY ANALYSIS

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AIR QUALITY ANALYSIS

As described in section 3.4, air quality in a given location is described by the concentration of various pollutants in the atmosphere. The significance of the pollutant concentration is determined by comparing it to the federal and state ambient air quality standards. These standards (Table D-1) represent the maximum allowable atmospheric concentrations that may occur while ensuring protection of public health and welfare, with a reasonable margin of safety. The Nevada Division of Environmental Protection, Bureau of Air Quality has adopted the NAAQS, with the following exceptions and additions: 1) state annual SO_2 standard is more stringent than the national standard; 2) a new 8-hour CO standard specific to elevations greater than 5,000 feet above mean seal level; and 3) new standards for visibility. The state ambient air quality standards are also summarized in Table D-1.

The air quality analysis in this EIS examined impacts from air emissions associated with the proposed action. As part of the analysis, emissions generated from construction/demolition, aircraft operation, aerospace ground equipment (AGE), motor vehicles, and other area (nonmobile) sources were examined for carbon monoxide (CO), nitrogen oxides (NO_X), sulfur dioxide (SO_X), ozone (in the form of volatile organic compounds VOCs), and particulate matter (PM_{10} and $PM_{2.5}$). Currently, Clark County is in serious nonattainment for CO (even though CO has not been exceeded since December 2000) and PM_{10}; in addition a portion of Clark County, the Las Vegas Valley in which Nellis AFB is found, is in subpart 1 (basic) nonattainment for 8-hour Ozone (precursors of this pollutant include NO_x and VOCs). Airborne criteria pollutant emissions of lead (Pb) are not included in this evaluation because there are no known significant lead emissions sources in the region or associated with the proposed action.

Construction Emissions

Construction activities would generate both combustive emissions from heavy equipment use and fugitive dust from ground-disturbing activities. Fugitive dust would be generated during construction activities associated with building construction, demolition, and modification. These emissions would be greatest during site clearing and grading activities. Emission rates for fugitive dust were estimated using guidelines outlined in the Western Regional Air Partnership (WRAP) fugitive dust handbook (WRAP 2004). These guidelines were developed for use in western states and they assume standard dust mitigation best practices activities. After PM_{10} is estimated, the fraction of fugitive dust emitted as $PM_{2.5}$ is calculated based on the most recent WRAP study (MRI 2005) that recommends the use of a fractional factor of 0.10.

Table D-1 State and National Ambient Air Quality Standards[a]

	Nevada Standards[b]		*National Standards[c]*	
	AVERAGING TIME	CONCENTRATION	PRIMARY[d]	SECONDARY[d,e]
Ozone	1 Hour	235 μg/m^3 (0.12 ppm)	235 μg/m^3 (0.12 ppm)	Same as Primary
Carbon Monoxide less than 5,000 ft above MSL	8 Hours	10,500 μg/m^3 (9.0 ppm)	10 mg/m^3 (9.0 ppm)	None
Carbon Monoxide at or greater than 5,000 ft above MSL	8 Hours	7,000 μg/m^3 (6.0 ppm)		None
Carbon Monoxide at any elevation	1 Hour	40,500 μg/m^3 (35 ppm)	40 mg/m^3 (35 ppm)	None
Nitrogen Dioxide	Annual Arithmetic Mean	100 μg/m^3 (0.053 ppm)	100 μg/m^3 (0.053 ppm)	Same as Primary
Sulfur Dioxide	Annual Arithmetic Mean	80 μg/m^3 (0.03 ppm)	80 μg/m^3 (0.03 ppm)	None
	24 Hours	365 μg/m^3 (0.14 ppm)	365 μg/m^3 (0.14 ppm)	None
	3 Hours	1,300 μg/m^3 (0.5 ppm)	None	1,300 μg/m3 (0.5 ppm)
Particulate Matter as PM_{10}[f]	24 Hours	150 μg/m^3	150 μg/m^3	Same as Primary
Particulate Matter as $PM_{2.5}$[g]	Annual		15 μg/m^3	Same as Primary
	24 Hours		65 μg/m^3	---
Lead (Pb)	Quarterly Arithmetic Mean	1.5 μg/m^3	1.5 μg/m^3	Same as Primary
Hydrogen sulfide	1 hour	112 μg/m^3 0.08 ppm	--	--

Source: U.S. EPA 2006 and Nevada Administrative Code.

Notes: a: These standards, other than for ozone and those based on annual averages, must not be exceeded more than once per year. The ozone standard is attained when the expected number of days per calendar year with a maximum hourly average concentration above the standard is equal to or less than one.

b: These standards must not be exceeded in areas where the general public has access.

c: National primary standards are the levels of air quality necessary, with an adequate margin of safety, to protect the public health.

d: Concentration is expressed first in units in which it was adopted and is based upon a reference temperature of 25° C and a reference pressure of 760 mm of mercury. All measurements of air quality must be corrected to a reference temperature of 25° C and a reference pressure of 760 mm of Hg (1,013.2 millibars); ppm in this table refers to ppm by volume, or micromoles of regulated air pollutant per mole of gas.

e: National secondary standards are the levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a regulated air pollutant.

f: USEPA promulgated new standards for PM, including removal of the PM10 annual standard.

g: In December 2006, a new 24-hour standard for $PM_{2.5}$ went into effect, from 65 ug/m^3 to 35 ug/m^3. The USEPA will designate nonattainment areas by April 2010.

Construction for the proposed action would disturb approximately 36 acres between 2009 and 2014. In 2009, airfield pavement totaling 118,400 square feet (2.72 acres) would be constructed; in 2010 a total of 141,995 square feet, or 3.26 acres of land would be disturbed due to construction of multiple facilities and parking areas. In 2011, aircraft ramp construction along with new buildings and an engine shop addition would require 258,167 square feet of disturbance (or 6 acres). In 2013, a sizeable airfield ramp area would be constructed, as well as a live ordnance loading area expansion, construction of three munitions igloos, and pad and parking area construction, which would account for 899,963 square feet (or about 21 acres) of soil disturbance. In 2014, two hangars, a low observables composite addition and parking areas would be constructed for a total of 154,304 square feet, or 3.5 acres. Factors needed to derive the construction source emission rates were obtained from *Compilation of Air Pollution Emission Factors, AP-42, Volume I* (USEPA 1995); *Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling* (USEPA 2004a); *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling—Compression-Ignition* (USEPA 2004b); *Nonroad Engine and Vehicle Emission Study—Report* (USEPA 1991); *Exhaust Emission Factors for Nonroad Engine Modeling—Spark-Ignition* (USEPA 2004c); *Conversion Factors for Hydrocarbon Emission Components* (USEPA 2004d); *Comparison of Asphalt Paving Emission Factors* (CARB 2005); *WRAP Fugitive Dust Handbook* (WRAP 2004); *Analysis of the Fine Fraction of Particulate Matter* (MRI 2005);and *EMFAC 2002* (v2.2) *Emission Factors (On-Road)* (CARB 2002).

The analysis assumed that all construction equipment was manufactured before 2000. This approach provides a conservative value for emissions from proposed construction equipment, as the future equipment fleet would include a substantial amount of newer, lower-emitting equipment compared to pre-2000 equipment. The analysis also inherently reduced PM_{10} fugitive dust emissions from earth-moving activities by 50 percent as this control level is included in the emission factor itself. Diesel exhaust is a primary, well-documented source of $PM_{2.5}$ emissions. However, ratios of PM_{10} to $PM_{2.5}$ in diesel exhaust are not yet published and therefore, for the purposes of this EIS, all PM emissions are equally distributed as PM_{10} and $PM_{2.5}$.

Mobile source emissions were calculated for construction workers for each of the construction years using MOBILE6 modeling. This analysis assumed that no new construction jobs would be created under the proposed action, so no new commuting emissions to and from the base would be incurred within the regional area. This assumption is justified because of the rapid growth occurring in the Las Vegas Valley and the amount of construction to support this growth. These workers would be traveling somewhere in the Las Vegas Valley for their jobs so going to Nellis AFB would not introduce new emissions; therefore, the average mileage that was assumed for each worker was 6 miles. This amount accounts for on-base trips and driving during breaks. It was assumed that the speed of the vehicle would not exceed an average of 30 miles per hour.

Mobile emissions from commuting Air Force personnel were also calculated for those years (using the MOBILE6 model) in which the additional personnel would come to the base (2012, 2017, and 2022) and assumed that only 87 percent of these additional personnel would commute to and from the base. This assumption is supported by the Bureau of Transportation Statistics (BTS 2001) which indicate that 87 percent of the U.S. population drives their car to and from work and by examination of Nellis AFB existing commuting personnel numbers. These calculations also assumed a round trip distance of 20 miles per day, at a rate not exceeding an average of 30 miles per hour (South Nevada Regional Transportation Commission 2007).

Airfield and Airspace Operations

Emissions for the F-35 aircraft engine (F-135) were calculated using data provided by the Joint Strike Force Program Office in charge of design and development of the F-35 aircraft. Because the aircraft is still in the research stage and no operational data are available, the parameters for each time in mode (e.g., minutes at taxi/idle, takeoff, climbout, approach, and aircraft testing operations) were derived from the test engine and aircraft. In terms of maintenance, the aerospace ground equipment (AGE) emissions used the fighter aircraft AGE default equipment found in the Air Conformity Applicability Model (ACAM) 4.3 as a surrogate since this equipment is still in the research stage. Because the proposed action is scheduled to take place over several years, emissions were calculated for the years in which the F-35 would be phased into the Nellis AFB inventory and overlap with construction activities.

This analysis used the best available data; however, when new operational aircraft and engine data are available the Air Force will re-evaluate emissions and determine whether substantial changes in this EIS's conclusions would be required. If that is the case, this information will be supplemented to this EIS and disseminated to the public.

Emission calculations within NTTR airspace used the number of F-35 projected operations below 7,000 feet AGL (refer to Table 4.4-4), calculated the percent contribution of these added aircraft to the regional emissions, and compared these emissions to the baseline number.

For both Nellis AFB and NTTR, the upper limits of the mixing height varies from region to region based on daily temperature changes, amount of sunlight, winds, and other climatic factors. Emissions released above the mixing height become so widely dispersed before reaching ground level that any potential ground-level effects would not be measurable. Studies using National Weather Service stations throughout the U.S. (Holzworth 1972) provide a measure of the meteorological conditions to define mixing heights. For the areas encompassing Nellis AFB and NTTR, mixing heights average about 1,100 feet AGL in the morning and 8,000 feet AGL in the afternoon. Based on this pattern and coordination with the Clark County DAQEM, the average mixing height for the base and airspace is considered to be 7000 feet AGL for this analysis. For the base airfield environment all 17,280 airfield operations were assumed to occur below 7,000 feel AGL and in NTTR airspace, 15,552 F-35 sortie-operations would occur below 7,000 feet. Refer to Table D-2 and the following pages to obtain specific data about aircraft power settings and assumptions, operational and construction emissions, as well as references.

Please note that all data is as complete as possible as of the publication of this EIS. The Air Force recognizes that these data reflect the test engine; however, as soon as new emissions data are available, the Air Force will analyze them to determine whether they will impact conformity. If the findings substantially change the conclusions reached in this document, new information will be supplemented and made available to the public.

Table D-2 F-35 Aircraft Engine Emissions Assumptions

POW_SET	*POWER_AC_MODE*	*POW_SET_NO*	*POW_SET_TEST*	*POW_SET_TEST_NO*	*POW_SET_TEST_PERC_PERC*	*WORD_POW_SET*	*NO_X_LBHR*	*SO_X_LBHR*[3]	*CO_LBHR*	*VOC_LBHR*	*PM_LBHR*
AB	Takeoff	2	AB	5	5	AB-5	588.95	71.92	1286.59	14.38	91.9
AP	Approach	4	AP	2	45	Approach	68.6	5.09	6.5	1.23	28.91
ID	Taxi/Idle-out Taxi/Idle-in	1 5	ID	1	20	Idle	8.81	1.72	36.77	2.8	13.57
IN	*	3	IN	3	15	Intermediate 70%	264.66	11.58	8.66	1.84	46.59
MI	Climbout	3	MI	4	15	Intermediate	1,567.58	21.24	11.31	3.26	59.47

Sources:

[1] Time-in-mode and F135 fuel flow rates for conventional operations are from (2006 FFR for Conformity.xls) e-mailed from Jean Hawkins (JSF Program staff) to Flint Webb and Jon Fetter-Deggas, 21 April 2006.

[2] F-135 NO_x, CO, and HC (i.e., VOCs) emissions equations are curve fit from Graves 2002. "JSF Engine Emissions", PowerPoint presentation made to the JSF Program Office, 4 November 2002. PM EIs from AESO 2000-04. Aircraft Environmental Support Office (AESO). "Estimated Particulate Emission Indexes for the JSF F119 Variant Engine, Draft," AESO Memo Report 2000-04, Rev. A, No date file transmitted via e-mail from Lyn Coffer via Jean Hawkins to Flint Webb dated August 27, 2002.

[3] SO_2 emissions assumes 0.045 percent sulfur content of the fuel by weight based on O'Brien, Robert J. and Wade, Mark D., "Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations", published by the Air Force Institute for Environment, Safety and Occupational Health Risk Analysis (AFIERA), Risk Analysis Directorate, Environmental Analysis Division, IERA-RS-BR-SR-2001-0010, January 2002 which reports the data to be "Based on average values from the report titled "Survey of Jet Fuels Aircraft Support Center, 1990-1996."

[4] APU NO_x, CO, and HC emissions from Bobalik, John M., "IPP Emissions", e-mail to Flint Webb Via Jim McCartney (JPO PTMS POC) and Jean Hawkins (JSF Environmental, Safety and Health Team Lead), September 9, 2002. PM emissions from Aircraft Environmental Support Office (AESO). "Aircraft Emission Estimates: F/A-18 Landing and Takeoff Cycle and In-Frame, Maintenance Testing Using JP-5", AESO Memorandum Report No. 9815, Revision E, November 2002.

[5] CO, VOCs, and NO_x emission indices above 50,000 lb/hr are taken equal to those given for the F119-PW-100 at power setting AB-5 from Wade, Mark D. (AFIERA/RSEQ), (F119-PW-100.xls) spreadsheet e-mailed to Flint Webb via Capt. Paul J. Benarchzyk (ASC/FBM) and Lt. Chad F. Schroeder (ASC/FBJ), January 10, 2002. Specific indices are proprietary information and not available for public review.

Results

The results of the construction and commuting emission calculations for the years 2009 through 2022 are found in Table 4.4-1. Emissions for airfield and airspace are found in Tables 4.4-2. Upon completion of the beddown, the 36 F-35 aircraft and AGE would contribute the following to those pollutants in nonattainment: 132.58 tons of CO emissions, 184.79 tons of NO_x, 10.66 tons of VOCs, and 51.01 tons of PM_{10}. The Air Force is coordinating with the Clark County DAQEM to include the F-35 NO_x emissions in their Ozone SIP revision. The Air Force expects to make a positive conformity determination for the increase in ozone precursor emissions resulting from the proposed action. To accomplish this outcome, Clark County DAQEM would either expressly identify the projected NO_x emissions in the SIP (40 CFR Sec. 93.158(a)(1) or determine the emissions would not exceed the SIP's NO_x emissions budget (40 CFR Sec. 93.158(a)(5)(i)(A). Similarly, the Air Force expects to make a positive conformity determination for the increased CO emissions as a result of Clark County DAQEM determining that the projected increase, together with all other sources of CO emissions in the air basin, would not exceed the SIP emissions budget (40 CFR Section 93.158(a)(5)(i)(A)).

Total emissions for NTTR, including those by the F-35, would continue to be distributed throughout a volume of air of 13,000 cubic miles resulting in low criteria pollutant concentrations. NO_x emissions in NTTR would continue to be a significant contributor to Nye County regional emissions with an approximate 1 percent increase from baseline conditions. However, air quality effects associated with total NTTR aircraft operations would continue to be regionally insignificant and occur in a majority of airspace that is unclassified (or assumed to be in attainment) for all criteria pollutants.

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

16 January 2008

Clark County Department of Air Quality and Environmental Management
500 S Grand Central Pkwy
PO Box 555210
Las Vegas, NV 89155-5210

Dear Mr. Deyo,

Please consider this our formal request to include nitrogen oxide (NO_x) emissions from the proposed F-35 beddown at Nellis AFB, Nevada, in Clark County's upcoming State Implementation Plan (SIP) revision for ozone. As was discussed between representatives of Nellis AFB, Clark County Dept of Air Quality and Environmental Management, and Headquarters Air Combat Command, the County may be able to accommodate the additional 185 tons of NO_x which would be emitted per year, as part of Clark County's Ozone SIP revision to meet National Ambient Air Quality Standard compliance. This would allow the AF to comply with General Conformity requirements, as outlined in Section 176(c) of the Clean Air Act, as well as demonstrating conformity under 40 CFR 93.158(a)(1). We request that you provide us with formal confirmation that this accommodation can be made.

The proposed beddown of F-35 aircraft would begin in 2009, with construction continuing through 2014. The first aircraft would arrive in 2012, and conclude in 2022 with a total of 36 F-35. NO_x emissions would remain below de minimis levels per year, until the aircraft number reaches 24, expected in 2017, increasing NO_x emissions to 125 tons/year. By 2022, NO_x emissions generated either directly or indirectly from the proposed beddown would be 185 tons per year. We have attached a general spreadsheet which illustrates the projected emissions per year for all criteria pollutants associated with the proposed beddown. Should the projected emissions increase or decrease based on revised engine emission data, our environmental analysis would be updated, with your coordination.

HQ ACC point of contact for this conformity determination is Ms. Sheryl K. Parker. She may be contacted at 757.764.9334 if you have any questions pertaining to this request.

BRUCE W. MACDONALD, P.E.
Headquarters Air Combat Command
Chief, Programs Division

Attachment:
F-35 Proposed Emissions

F-35 Beddown TOTAL Air Emissions
Tons/Year
Includes construction, commuting, and operational emissions

2009

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
0.12	0.50	1.19	0.13	1.21	0.18

2010

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
0.90	5.29	6.26	0.67	3.90	0.75

2011

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
0.59	2.78	5.50	0.61	4.26	0.73

2012

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
2.23	24.80	31.81	1.24	8.20	8.20

2013

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
3.15	28.36	39.57	2.12	22.31	10.02

2014

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
3.10	31.73	34.46	1.48	9.62	8.48

2015

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
4.36	49.64	62.51	3.49	17.39	17.39

2017

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
7.38	86.80	123.69	6.97	34.71	34.71

2022

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
10.40	123.96	184.87	9.45	51.03	51.03

F-35 Beddown TOTAL Air Emissions
Tons/Year
Includes construction, commuting, and operational emissions

2009

VOC	CO	NOx	PM_{10}
0.11	0.43	1.32	1.22

2010

VOC	CO	NOx	PM_{10}
0.80	5.02	6.11	3.89

2011

VOC	CO	NOx	PM_{10}
0.61	3.29	5.50	4.25

2012

VOC	CO	NOx	PM_{10}
2.49	30.55	31.88	8.19

2013

VOC	CO	NOx	PM_{10}
3.34	33.80	39.57	22.30

2014

VOC	CO	NOx	PM_{10}
2.67	31.58	33.83	9.57

2015

VOC	CO	NOx	PM_{10}
3.88	48.53	61.85	17.35

2017

VOC	CO	NOx	PM_{10}
7.54	94.14	123.53	34.69

2022

VOC	CO	NOx	PM_{10}
10.66	132.58	184.79	51.01

F-35 Beddown Air Emission Totals - Years 2012 - 2022

(Emissions from F-35 Staff Commuting overlapping with Air Operations)

2012

VOC	CO	NOx	PM_{10}
2.49	30.44	31.88	8.19

2013

VOC	CO	NOx	PM_{10}
2.42	29.90	31.81	8.19

2014

VOC	CO	NOx	PM_{10}
2.37	29.45	31.76	8.19

2015

VOC	CO	NOx	PM_{10}
3.88	48.53	61.85	17.35

2017

VOC	CO	NOx	PM_{10}
7.54	94.14	123.53	34.69

2022

VOC	CO	NOx	PM_{10}
10.66	132.58	184.79	51.01

F-35 Beddown Construction Air Emission Totals*
Tons/Year

2009

VOC	CO	NOx	PM10
0.11	0.43	1.32	1.22

2010

VOC	CO	NOx	PM10
0.80	5.02	6.11	3.89

2011

VOC	CO	NOx	PM10
0.61	3.29	5.50	4.25

2013

VOC	CO	NOx	PM10
0.92	3.91	7.75	14.11

2014

VOC	CO	NOx	PM10
0.30	2.13	2.07	1.38

Construction occurs between 2009 and 2014, construction worker commutin occurs also between these years.

*Includes construction equipment, soil disturbance, demolition, and construct commuting emissions.

Commuting Emissions - Calculated Using Mobile6

2009

Onsite F-35 Construction POVs

# vehicles	mi/day****	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	PM10 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	PM10 lb/yr
90	6	250	0.00257	0.031	0.00205	5.5776E-05	348	4,185	277	8

2009 Total	VOCs	CO	NOx	PM10
Tons Per Year	**0.1738**	**2.0923**	**0.1386**	**0.0038**

2010

Onsite F-35 Construction POVs

# vehicles	mi/day	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	PM10 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	PM10 lb/yr
130	6	250	0.00238	0.0289	0.0019	5.55556E-05	465	5,636	371	11

2010 Total	VOCs	CO	NOx	PM10
Tons Per Year	**0.2325**	**2.8180**	**0.1853**	**0.0054**

2011

Onsite F-35 Construction POVs

# vehicles	mi/day	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	PM10 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	PM10 lb/yr
65	6	250	0.00221	0.02723	0.00175	5.51146E-05	216	2,655	171	5

2011 Total	VOCs	CO	NOx	PM10
Tons Per Year	**0.1078**	**1.3273**	**0.0855**	**0.0027**

2012

F-35 Staff Commute

# vehicles**	mi/day***	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	PM10 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	PM10 lb/yr
193	20	250	0.00202	0.02561	0.00163	5.48942E-05	1,953	24,728	1,577	53
						Subtotal Tons Per Year	0.98	12.36	0.79	0.03

Onsite F-35 Construction POVs

# vehicles	mi/day	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	PM10 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	PM10 lb/yr
30	6	45	0.00202	0.02561	0.00163	5.48942E-05	16	207	13	0
						Subtotal Tons Per Year	0.01	0.10	0.01	0.00

2012 Total	VOCs	CO	NOx	PM10
Tons Per Year	**0.9849**	**12.4677**	**0.7949**	**0.0267**

2013

F-35 Staff Commute

# vehicles	mi/day	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	PM10 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	PM10 lb/yr
193	20	250	0.00189	0.02447	0.0015	5.48942E-05	1,826	23,632	1,450	53
						Subtotal Tons Per Year	0.91	11.82	0.72	0.03

Onsite F-35 Construction POVs

# vehicles	mi/day	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	PM10 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	PM10 lb/yr
60	6	250	0.00189	0.02447	0.0015	5.48942E-05	170	2,202	135	5
						Subtotal Tons Per Year	0.09	1.10	0.07	0.00

2013 Total	VOCs	CO	NOx	PM10
Tons Per Year	**0.9979**	**12.9170**	**0.7925**	**0.0290**

2014

F-35 Staff Commute

# vehicles	mi/day	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	PM10 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	PM10 lb/yr
193	20	250	0.00178	0.02354	0.00139	5.48942E-05	1,719	22,737	1,342	53
						Subtotal Tons Per Year	0.86	11.37	0.67	0.03

Onsite F-35 Construction POVs

# vehicles	mi/day	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	PM10 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	PM10 lb/yr
80	6	250	0.00178	0.02354	0.00139	5.48942E-05	214	2,825	167	7
						Subtotal Tons Per Year	0.11	1.41	0.08	0.00

2014 Total	VOCs	CO	NOx	PM10
Tons Per Year	**0.9664**	**12.7814**	**0.7546**	**0.0298**

2014 is the last overlapping year of construction, beddown, and aircraft operations.
F-35 commuting emissions remain constant at 2014 levels.

2017

F-35 Staff Commute

# vehicles	mi/day	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	PM10 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	PM10 lb/yr
337	20	250	0.00178	0.02354	0.00139	5.48942E-05	2,997	39,637	2,340	92
						Total Tons Per Year	**1.50**	**19.82**	**1.17**	**0.05**

2022

F-35 Staff Commute

# vehicles	mi/day	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	PM10 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	PM10 lb/yr
358	20	250	0.00178	0.02354	0.00139	5.48942E-05	3,190	42,197	2,491	98
						Total Tons Per Year	**1.60**	**21.10**	**1.25**	**0.05**

*Assumes 6 miles per day for travel within Nellis AFB, during breaks, and at lunchtime. Also assumed that these are existing construction workers in Las Vegas, no new additional workers would be required thus no new commuting to and from work would be incurred.

**Based on current proportion (87%) of personnel in private vehicles exiting/entering all gates at Nellis AFB (Comprehensive Traffic Study 2006).

***Southern Nevada Regional Transportation Commission, email correspondence October 2007. Average roundtrip daily commute for income levels greater than $50,000.

F-35 Beddown Construction Air Emissions

2009

Construct East Ramp 2.72 acres 118,400 sq ft

Site prep (grading, compacting, drainage, etc.)						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb	lb	lb	lb	lb
Dozer	2	8	3	299	0.58	0.68	2.7	8.38	0.93	0.402	12	50	154	17	7
Backhoe/loader	3	8	30	98	0.21	0.99	3.49	6.9	0.85	0.722	32	114	225	28	24
Grader	3	8	5	135	0.58	0.68	2.7	8.38	0.93	0.402	14	56	174	19	8
Small diesel engines	3	8	30	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	5	28	36	6	3
Dump truck (12 CY)	32	1	30	275	0.21	0.68	2.7	8.38	0.89	0.402	83	330	1024	109	49
										Subtotal	147	578	1613	179	91

Concrete apron construction						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb	lb	lb	lb	lb
Skid steer loader	4	4	30	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	9	39	91	15	8
Concrete truck (9 CY)	24	1	21	250	0.21	0.68	2.7	8.38	0.89	0.402	40	158	489	52	23
Dump truck (12 CY)	2	0.5	8	275	0.21	0.68	2.7	8.38	0.89	0.402	1	3	9	1	0
Delivery truck	2	1	7	180	0.21	0.68	2.7	8.38	0.89	0.402	1	3	10	1	0
Backhoe/loader	2	8	30	98	0.21	0.99	3.49	6.9	0.85	0.722	22	76	150	19	16
										Subtotal	71	278	749	88	48

PM_{10} tons/acre/mo	acres	days of disturbance	**PM_{10}** Total	**$PM_{2.5}$/ PM_{10}** Ratio	**$PM_{2.5}$** Total
0.42	3	30	1.1	0.1	0.1

	VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
2009 Annual Total in Tons	0.11	0.43	1.18	0.13	1.21	0.18

2010

Construct Thunder Aircraft Maintenance Unit 11,000 sq ft 75,000 sq ft

Site prep (grading, drainage, utilities etc.)						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb	lb	lb	lb	lb
Dozer	1	4	11	299	0.58	0.68	2.7	8.38	0.93	0.402	11	45	141	16	7
Grader	1	4	7	135	0.58	0.68	2.7	8.38	0.93	0.402	3	13	41	4	2
Skid steer loader	2	4	22	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	3	14	33	6	3
Backhoe/loader	1	6	22	98	0.21	0.99	3.49	6.9	0.85	0.722	6	21	41	5	4
Small diesel engines	1	4	22	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	3	4	1	0
Dump truck	8	1	7	275	0.21	0.68	2.7	8.38	0.89	0.402	5	19	60	6	3
										Subtotal	29	116	320	38	19

Foundation (slab)						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb	lb	lb	lb	lb
Skid steer loader	2	2	5	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	0	2	4	1	0
Concrete truck	4	1	7	250	0.21	0.68	2.7	8.38	0.89	0.402	2	9	27	3	1
Dump truck	4	1	5	275	0.21	0.68	2.7	8.38	0.89	0.402	2	7	21	2	1
Delivery truck	6	6	5	180	0.21	0.68	2.7	8.38	0.89	0.402	10	41	126	13	6
Backhoe/loader	1	8	5	98	0.21	0.99	3.49	6.9	0.85	0.722	2	6	13	2	1
Small diesel engines	2	2	24	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	4	5	1	0
										Subtotal	17	68	195	22	10

Structure						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb	lb	lb	lb	lb
Small diesel engines	2	4	4	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	1	2	0	0
Delivery truck	1	2	11	180	0.21	0.68	2.7	8.38	0.89	0.402	1	5	15	2	1
Skid steer loader	2	4	18	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	3	12	27	5	2
Dump truck	2	1	4	275	0.21	0.68	2.7	8.38	0.89	0.402	1	3	9	1	0
Crane	1	8	6	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	2	5	31	5	2
										Subtotal	7	25	84	12	5

F-35 Beddown Construction Air Emissions

Construct 6-Bay F-35 Hangar/Aircraft Maintence Unit — 80,988 sq ft — 90,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Dozer	1	4	9	299	0.58	0.68	2.7	8.38	0.93	0.402	9	37	115	13	6
Grader	1	4	9	135	0.58	0.68	2.7	8.38	0.93	0.402	4	17	52	6	2
Skid steer loader	2	4	56	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	8	36	85	14	7
Backhoe/loader	1	6	56	98	0.21	0.99	3.49	6.9	0.85	0.722	15	53	105	13	11
Small diesel engines	1	4	56	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	2	9	11	2	1
Dump truck	8	1	9	275	0.21	0.68	2.7	8.38	0.89	0.402	6	25	77	8	4
										Subtotal	44	177	446	56	31

Foundation (slab)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Skid steer loader	2	2	51	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	4	16	39	6	3
Concrete truck	5	1	34	250	0.21	0.68	2.7	8.38	0.89	0.402	13	53	165	18	8
Dump truck	6	1	21	275	0.21	0.68	2.7	8.38	0.89	0.402	11	43	134	14	6
Delivery truck	1	1	111	180	0.21	0.68	2.7	8.38	0.89	0.402	6	25	78	8	4
Backhoe/loader	1	8	21	98	0.21	0.99	3.49	6.9	0.85	0.722	8	27	53	6	6
Small diesel engines	2	2	141	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	4	22	28	5	2
										Subtotal	46	186	496	58	29

Structure

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Small diesel engines	2	4	60	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	3	19	24	4	2
Delivery truck	1	2	71	180	0.21	0.68	2.7	8.38	0.89	0.402	8	32	99	11	5
Skid steer loader	2	4	229	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	32	147	348	58	29
Concrete truck	4	2	34	250	0.21	0.68	2.7	8.38	0.89	0.402	21	85	264	28	13
Crane	1	8	38	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	12	30	195	32	10
										Subtotal	77	313	931	133	59

Construct Aircraft Washrack Addition, 1-bay to Building 271 — 9,551 sq ft — 25,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Dozer	1	4	2	299	0.58	0.68	2.7	8.38	0.93	0.402	2	8	26	3	1
Grader	1	4	2	135	0.58	0.68	2.7	8.38	0.93	0.402	1	4	12	1	1
Skid steer loader	2	4	10	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	6	15	3	1
Backhoe/loader	1	6	10	98	0.21	0.99	3.49	6.9	0.85	0.722	3	10	19	2	2
Small diesel engines	1	4	10	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	2	2	0	0
Dump truck	8	1	2	275	0.21	0.68	2.7	8.38	0.89	0.402	1	6	17	2	1
										Subtotal	9	35	90	11	6

Foundation (slab)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Skid steer loader	2	2	4	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	0	1	3	1	0
Concrete truck	4	4	4	250	0.21	0.68	2.7	8.38	0.89	0.402	5	20	62	7	3
Dump truck	6	6	2	275	0.21	0.68	2.7	8.38	0.89	0.402	6	25	77	8	4
Delivery truck	1	1	10	180	0.21	0.68	2.7	8.38	0.89	0.402	1	2	7	1	0
Backhoe/loader	1	8	2	98	0.21	0.99	3.49	6.9	0.85	0.722	1	3	5	1	1
Small diesel engines	2	2	16	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	2	3	1	0
										Subtotal	13	53	157	17	8

Structure

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Small diesel engines	2	4	8	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	2	3	1	0
Delivery truck	1	2	16	180	0.21	0.68	2.7	8.38	0.89	0.402	2	7	22	2	1
Concrete truck	4	4	4	250	0.21	0.68	2.7	8.38	0.89	0.402	5	20	62	7	3
Skid steer loader	2	4	28	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	4	18	43	7	4
Crane	1	8	3	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	1	2	15	3	1
										Subtotal	12	50	146	19	9

Construct Munitions Facility Addition at Building 10425 — 3,000 sq ft — 9,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Dozer	1	4	1	90	0.59	0.99	3.49	6.9	0.93	0.722	0	2	3	0	0
Grader	1	4	1	135	0.58	0.68	2.7	8.38	0.93	0.402	0	2	6	1	0
Skid steer loader	2	4	3	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	0	2	5	1	0
Backhoe/loader	1	6	3	98	0.21	0.99	3.49	6.9	0.85	0.722	1	3	6	1	1
Small diesel engines	1	4	3	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	0	1	0	0
Dump truck	8	1	1	275	0.21	0.68	2.7	8.38	0.89	0.402	1	3	9	1	0
										Subtotal	3	11	28	4	2

F-35 Beddown Construction Air Emissions

Foundation (s

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Skid steer loader	2	2	1	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	0	0	1	0	0
Concrete truck	4	4	1	250	0.21	0.68	2.7	8.38	0.89	0.402	1	5	16	2	1
Dump truck	6	6	1	275	0.21	0.68	2.7	8.38	0.89	0.402	3	12	38	4	2
Delivery truck	1	1	3	180	0.21	0.68	2.7	8.38	0.89	0.402	0	1	2	0	0
Backhoe/loader	1	2	1	98	0.21	0.99	3.49	6.9	0.85	0.722	0	0	1	0	0
Small diesel engines	2	2	5	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	1	1	0	0
										Subtotal	5	19	58	6	3

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Small diesel engines	2	4	1	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	0	0	0	0
Delivery truck	1	2	1	180	0.21	0.68	2.7	8.38	0.89	0.402	0	0	1	0	0
Concrete truck	4	4	1	250	0.21	0.68	2.7	8.38	0.89	0.402	1	5	16	2	1
Skid steer loader	2	4	2	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	0	1	3	1	0
Crane	1	8	1	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	0	1	5	1	0
										Subtotal	2	8	25	3	1

Construct Two F-25 Munitions Igloos 4,800 sq ft 20,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Dozer	1	4	2	299	0.58	0.68	2.7	8.38	0.93	0.402	2	8	26	3	1
Grader	1	4	2	135	0.58	0.68	2.7	8.38	0.93	0.402	1	4	12	1	1
Skid steer loader	2	4	7	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	5	11	2	1
Backhoe/loader	1	6	7	98	0.21	0.99	3.49	6.9	0.85	0.722	2	7	13	2	1
Small diesel engines	1	4	7	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	1	1	0	0
Dump truck	8	1	2	275	0.21	0.68	2.7	8.38	0.89	0.402	1	6	17	2	1
										Subtotal	7	30	79	10	5

Foundation (slab)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Skid steer loader	2	2	10	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	3	8	1	1
Concrete truck	4	1	4	250	0.21	0.68	2.7	8.38	0.89	0.402	1	5	16	2	1
Dump truck	8	1	2	275	0.21	0.68	2.7	8.38	0.89	0.402	1	6	17	2	1
Delivery truck	6	6	3	180	0.21	0.68	2.7	8.38	0.89	0.402	6	24	75	8	4
Backhoe/loader	1	8	2	98	0.21	0.99	3.49	6.9	0.85	0.722	1	3	5	1	1
Small diesel engines	2	2	10	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	2	2	0	0
										Subtotal	10	42	123	14	7

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Small diesel engines	2	4	6	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	2	2	0	0
Delivery truck	1	1	16	180	0.21	0.68	2.7	8.38	0.89	0.402	1	4	11	1	1
Skid steer loader	2	4	24	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	3	15	37	6	3
Dump truck	2	1	6	275	0.21	0.68	2.7	8.38	0.89	0.402	1	4	13	1	1
Crane	1	8	4	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	1	3	21	3	1
										Subtotal	7	28	83	12	5

Construct 25-mm Munitions Storage Facility Addition at M81 3,000 sq ft 9,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Dozer	1	4	1	90	0.59	0.99	3.49	6.9	0.93	0.722	0	2	3	0	0
Grader	1	4	1	135	0.58	0.68	2.7	8.38	0.93	0.402	0	2	6	1	0
Skid steer loader	2	4	3	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	0	2	5	1	0
Backhoe/loader	1	6	3	98	0.21	0.99	3.49	6.9	0.85	0.722	1	3	6	1	1
Small diesel engines	1	4	3	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	0	1	0	0
Dump truck	8	1	1	275	0.21	0.68	2.7	8.38	0.89	0.402	1	3	9	1	0
										Subtotal	3	11	28	4	2

Foundation (s

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Skid steer loader	2	2	1	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	0	0	1	0	0
Concrete truck	4	4	1	250	0.21	0.68	2.7	8.38	0.89	0.402	1	5	16	2	1
Dump truck	6	6	1	275	0.21	0.68	2.7	8.38	0.89	0.402	3	12	38	4	2
Delivery truck	1	1	3	180	0.21	0.68	2.7	8.38	0.89	0.402	0	1	2	0	0
Backhoe/loader	1	2	1	98	0.21	0.99	3.49	6.9	0.85	0.722	0	0	1	0	0
Small diesel engines	2	2	5	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	1	1	0	0
										Subtotal	5	19	58	6	3

F-35 Beddown Construction Air Emissions

Structure						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb	lb	lb	lb	lb
Small diesel engines	2	4	1	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	0	0	0	0
Delivery truck	1	2	1	180	0.21	0.68	2.7	8.38	0.89	0.402	0	0	1	0	0
Concrete truck	4	4	1	250	0.21	0.68	2.7	8.38	0.89	0.402	1	5	16	2	1
Skid steer loader	2	4	2	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	0	1	3	1	0
Crane	1	8	1	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	0	1	5	1	0
										Subtotal	2	8	25	3	1

Construct Munitions Trailer Facility — 10,000 sq ft — 100,000 sq ft

Site prep (grading, drainage, utilities etc.)						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb	lb	lb	lb	lb
Dozer	1	4	11	299	0.58	0.68	2.7	8.38	0.93	0.402	11	45	141	16	7
Grader	1	4	10	135	0.58	0.68	2.7	8.38	0.93	0.402	5	19	58	6	3
Skid steer loader	2	4	30	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	4	19	46	8	4
Backhoe/loader	1	6	30	98	0.21	0.99	3.49	6.9	0.85	0.722	8	29	56	7	6
Small diesel engines	1	4	30	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	5	6	1	1
Dump truck	8	1	11	275	0.21	0.68	2.7	8.38	0.89	0.402	8	30	94	10	5
										Subtotal	37	147	401	48	24

Foundation (slab)						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb	lb	lb	lb	lb
Skid steer loader	2	2	4	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	0	1	3	1	0
Concrete truck	4	1	5	250	0.21	0.68	2.7	8.38	0.89	0.402	2	6	19	2	1
Dump truck	6	1	3	275	0.21	0.68	2.7	8.38	0.89	0.402	2	6	19	2	1
Delivery truck	6	6	3	180	0.21	0.68	2.7	8.38	0.89	0.402	6	24	75	8	4
Backhoe/loader	1	8	3	98	0.21	0.99	3.49	6.9	0.85	0.722	1	4	8	1	1
Small diesel engines	2	2	18	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	3	4	1	0
										Subtotal	11	45	128	14	7

Structure						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb	lb	lb	lb	lb
Small diesel engines	2	4	3	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	1	1	0	0
Delivery truck	1	2	8	180	0.21	0.68	2.7	8.38	0.89	0.402	1	4	11	1	1
Skid steer loader	2	4	13	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	2	8	20	3	2
Dump truck	3	2	7	275	0.21	0.68	2.7	8.38	0.89	0.402	4	14	45	5	2
Crane	1	8	6	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	2	5	31	5	2
										Subtotal	8	32	108	15	6

Construct Two (2) Loading Docks — 1,000 sq ft — 5,000 sq ft

Site prep (grading, drainage, utilities etc.)						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb	lb	lb	lb	lb
Dozer	1	4	1	299	0.58	0.68	2.7	8.38	0.93	0.402	1	4	13	1	1
Grader	1	4	1	135	0.58	0.68	2.7	8.38	0.93	0.402	0	2	6	1	0
Skid steer loader	2	4	3	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	0	2	5	1	0
Backhoe/loader	1	6	3	98	0.21	0.99	3.49	6.9	0.85	0.722	1	3	6	1	1
Small diesel engines	1	4	3	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	0	1	0	0
Dump truck	8	1	1	275	0.21	0.68	2.7	8.38	0.89	0.402	1	3	9	1	0
										Subtotal	4	14	38	5	2

Foundation (slab)						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb	lb	lb	lb	lb
Skid steer loader	2	2	1	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	0	0	1	0	0
Concrete truck	4	1	1	250	0.21	0.68	2.7	8.38	0.89	0.402	0	1	4	0	0
Dump truck	8	1	1	275	0.21	0.68	2.7	8.38	0.89	0.402	1	3	9	1	0
Delivery truck	1	1	1	180	0.21	0.68	2.7	8.38	0.89	0.402	0	0	1	0	0
Backhoe/loader	1	8	1	98	0.21	0.99	3.49	6.9	0.85	0.722	0	1	3	0	0
Small diesel engines	2	2	1	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	0	0	0	0
										Subtotal	2	6	17	2	1

Construct Precision-Guided Missile Bay Addition at Building 10439 — 3,000 sq ft — 15,000 sq ft

Site prep (grading, drainage, utilities etc.)						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb	lb	lb	lb	lb
Dozer	1	4	2	299	0.58	0.68	2.7	8.38	0.93	0.402	2	8	26	3	1
Grader	1	4	2	135	0.58	0.68	2.7	8.38	0.93	0.402	1	4	12	1	1
Skid steer loader	2	4	7	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	5	11	2	1
Backhoe/loader	1	6	7	98	0.21	0.99	3.49	6.9	0.85	0.722	2	7	13	2	1
Small diesel engines	1	4	7	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	1	1	0	0
Dump truck	8	1	2	275	0.21	0.68	2.7	8.38	0.89	0.402	1	6	17	2	1
										Subtotal	7	30	79	10	5

F-35 Beddown Construction Air Emissions

Foundation (slab)						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	*g/hp-hr*	*g/hp-hr*	*g/hp-hr*	*g/hp-hr*	*g/hp-hr*	lb	lb	lb	lb	lb
Skid steer loader	2	2	3	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	0	1	2	0	0
Concrete truck	5	1	1	250	0.21	0.68	2.7	8.38	0.89	0.402	0	2	5	1	0
Dump truck	5	1	1	275	0.21	0.68	2.7	8.38	0.89	0.402	0	2	5	1	0
Delivery truck	1	1	3	180	0.21	0.68	2.7	8.38	0.89	0.402	0	1	2	0	0
Backhoe/loader	1	8	1	98	0.21	0.99	3.49	6.9	0.85	0.722	0	1	3	0	0
Small diesel engines	2	2	3	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	0	1	0	0
										Subtotal	2	7	18	2	1

Structure						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	*g/hp-hr*	*g/hp-hr*	*g/hp-hr*	*g/hp-hr*	*g/hp-hr*	lb	lb	lb	lb	lb
Small diesel engines	2	4	2	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	1	1	0	0
Delivery truck	1	1	4	180	0.21	0.68	2.7	8.38	0.89	0.402	0	1	3	0	0
Skid steer loader	2	4	6	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	4	9	2	1
Dump truck	2	1	2	275	0.21	0.68	2.7	8.38	0.89	0.402	0	1	4	0	0
Crane	1	8	2	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	1	2	10	2	1
										Subtotal	2	8	27	4	2

Construct parking areas 15,656 sq ft

						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	*g/hp-hr*	*g/hp-hr*	*g/hp-hr*	*g/hp-hr*	*g/hp-hr*	lb	lb	lb	lb	lb
Grader	1	4	2	135	0.58	0.68	2.7	8.38	0.93	0.402	1	4	12	1	1
Roller	2	4	2	30	0.59	1.8	5	6.9	1.00	0.8	1	3	4	1	0
Paver	1	4	2	107	0.59	0.68	2.7	8.38	0.93	0.402	1	3	9	1	0
Concrete truck	4	3	3	250	0.21	0.68	2.7	8.38	0.89	0.402	3	11	35	4	2
Delivery truck	1	2	3	180	0.21	0.68	2.7	8.38	0.89	0.402	0	1	4	0	0
Small diesel engines	4	6	5	25	0.43	0.7628	4.1127	5.2298	0.93	0.9	2	12	15	3	3
										Total	8	34	79	10	6

Volume of hot mix asphalt	5220 ft^3
Average density of HMA	145 lb/ft^3
CARB EF for HMA	0.04 lb/ton
VOC emissions from HMA paving	15 lb

Demolish Bldgs 265, 268, 269 180,678 SF

						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	*g/hp-hr*	*g/hp-hr*	*g/hp-hr*	*g/hp-hr*	*g/hp-hr*	lb	lb	lb	lb	lb
Dozer	2	8	89	90	0.59	0.99	3.49	6.9	0.93	0.722	165	582	1,150	155	120
Skid steer loader	3	8	89	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	38	172	406	67	34
Crane	3	8	5	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	5	12	77	13	4
										Subtotal	207	765	1,634	235	159

						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*Number*	*Hr/day*	*# days*	*Hp*		*g/hp-hr*	*g/hp-hr*	*g/hp-hr*	*g/hp-hr*	*g/hp-hr*	lb	lb	lb	lb	lb
Backhoe/loader	8	14	25	98	0.21	0.99	3.49	6.9	0.85	0.722	126	443	877	108	92
Skid steer loader	8	14	25	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	50	225	533	88	45
Dump truck	32	4	25	275	0.21	0.68	2.7	8.38	0.89	0.402	277	1,100	3,414	363	164
										Subtotal	452	1,768	4,823	559	300

Truck transport of debris to disposal site

				ROG	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	ROG	CO	NOx	SOx	PM_{10}	$PM_{2.5}$
Equipment	*Number*	*# days*	*Trip Length*	lb/mi	lb/mi	lb/mi	lb/mi	lb/mi	lb/mi	lb	lb	lb	lb	lb	lb
Trucks	32	25	30	0.00373	0.01446	0.05	0.00004	0.00231	0.00204	90	347	1,132	1	55	48

PM_{10} tons/acre/mo	acres	days of disturbance	PM_{10} Total	$PM_{2.5}$/ PM_{10} Ratio	$PM_{2.5}$ Total
0.42	2.5	100	3.5	0.1	0.4

	VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
2010 Annual Total in Tons	0.57	2.20	5.93	0.67	3.89	0.73

F-35 Beddown Construction Air Emissions

2011

Construct Aerospace Ground Equipment Complex 45,000 sq ft 196,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO2** g/hp-hr	**PM** g/hp-hr	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM** lb
Dozer	1	4	11	299	0.58	0.68	2.7	8.38	0.93	0.402	11	45	141	16	7
Grader	1	4	10	135	0.58	0.68	2.7	8.38	0.93	0.402	5	19	58	6	3
Skid steer loader	2	4	30	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	4	19	46	8	4
Backhoe/loader	1	6	30	98	0.21	0.99	3.49	6.9	0.85	0.722	8	29	56	7	6
Small diesel engines	1	4	30	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	5	6	1	1
Dump truck	8	1	11	275	0.21	0.68	2.7	8.38	0.89	0.402	8	30	94	10	5
										Subtotal	37	147	401	48	24

Foundation (slab)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO2** g/hp-hr	**PM** g/hp-hr	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM** lb
Skid steer loader	2	2	81	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	6	26	62	10	5
Concrete truck	4	1	108	250	0.21	0.68	2.7	8.38	0.89	0.402	34	135	419	45	20
Dump truck	6	1	54	275	0.21	0.68	2.7	8.38	0.89	0.402	28	111	346	37	17
Delivery truck	6	6	54	180	0.21	0.68	2.7	8.38	0.89	0.402	110	437	1358	144	65
Backhoe/loader	1	8	54	98	0.21	0.99	3.49	6.9	0.85	0.722	19	68	135	17	14
Small diesel engines	2	2	365	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	11	57	72	13	6
										Subtotal	208	835	2392	265	127

Structure

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO2** g/hp-hr	**PM** g/hp-hr	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM** lb
Small diesel engines	2	4	15	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	5	6	1	1
Delivery truck	1	2	36	180	0.21	0.68	2.7	8.38	0.89	0.402	4	16	50	5	2
Skid steer loader	2	4	60	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	9	39	91	15	8
Dump truck	3	2	30	275	0.21	0.68	2.7	8.38	0.89	0.402	16	62	192	20	9
Crane	1	8	24	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	7	19	123	20	6
										Subtotal	36	140	463	62	26

Construct Weapons Release Building 15,000 sq ft 90,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO2** g/hp-hr	**PM** g/hp-hr	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM** lb
Dozer	1	4	3	299	0.58	0.68	2.7	8.38	0.93	0.402	3	12	38	4	2
Grader	1	4	3	135	0.58	0.68	2.7	8.38	0.93	0.402	1	6	17	2	1
Skid steer loader	2	4	17	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	2	11	26	4	2
Backhoe/loader	1	6	17	98	0.21	0.99	3.49	6.9	0.85	0.722	5	16	32	4	3
Small diesel engines	1	4	17	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	3	3	1	0
Dump truck	8	1	3	275	0.21	0.68	2.7	8.38	0.89	0.402	2	8	26	3	1
										Subtotal	14	56	143	18	10

Foundation (slab)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO2** g/hp-hr	**PM** g/hp-hr	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM** lb
Skid steer loader	2	2	6	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	0	2	5	1	0
Concrete truck	4	1	8	250	0.21	0.68	2.7	8.38	0.89	0.402	3	10	31	3	1
Dump truck	4	1	6	275	0.21	0.68	2.7	8.38	0.89	0.402	2	8	26	3	1
Delivery truck	6	6	4	180	0.21	0.68	2.7	8.38	0.89	0.402	8	32	101	11	5
Backhoe/loader	1	8	6	98	0.21	0.99	3.49	6.9	0.85	0.722	2	8	15	2	2
Small diesel engines	2	2	26	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	4	5	1	0
										Subtotal	16	64	182	20	10

Structure

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO2** g/hp-hr	**PM** g/hp-hr	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM** lb
Small diesel engines	2	4	5	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	2	2	0	0
Delivery truck	1	2	11	180	0.21	0.68	2.7	8.38	0.89	0.402	1	5	15	2	1
Skid steer loader	2	4	17	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	2	11	26	4	2
Dump truck	3	4	9	275	0.21	0.68	2.7	8.38	0.89	0.402	9	37	115	12	6
Crane	1	8	8	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	2	6	41	7	2
										Subtotal	16	61	200	25	11

Construct Test Operations Building 20,000 sq ft 66,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO2** g/hp-hr	**PM** g/hp-hr	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM** lb
Dozer	1	4	5	299	0.58	0.68	2.7	8.38	0.93	0.402	5	21	64	7	3
Grader	1	4	3	135	0.58	0.68	2.7	8.38	0.93	0.402	1	6	17	2	1
Skid steer loader	2	4	9	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	6	14	2	1
Backhoe/loader	1	6	9	98	0.21	0.99	3.49	6.9	0.85	0.722	2	9	17	2	2
Small diesel engines	1	4	9	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	1	2	0	0
Dump truck	8	1	3	275	0.21	0.68	2.7	8.38	0.89	0.402	2	8	26	3	1
										Subtotal	13	50	139	16	8

F-35 Beddown Construction Air Emissions

Foundation (slab)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Skid steer loader	2	2	9	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	3	7	1	1
Concrete truck	8	1	6	250	0.21	0.68	2.7	8.38	0.89	0.402	4	15	47	5	2
Dump truck	6	1	6	275	0.21	0.68	2.7	8.38	0.89	0.402	3	12	38	4	2
Delivery truck	1	1	18	180	0.21	0.68	2.7	8.38	0.89	0.402	1	4	13	1	1
Backhoe/loader	1	8	6	98	0.21	0.99	3.49	6.9	0.85	0.722	2	8	15	2	2
Small diesel engines	2	2	32	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	5	6	1	1
										Subtotal	12	47	126	14	7

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Small diesel engines	2	4	10	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	3	4	1	0
Delivery truck	1	2	12	180	0.21	0.68	2.7	8.38	0.89	0.402	1	5	17	2	1
Skid steer loader	2	4	38	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	5	24	58	10	5
Concrete truck	4	2	7	250	0.21	0.68	2.7	8.38	0.89	0.402	4	18	54	6	3
Crane	1	8	10	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	3	8	51	8	3
										Subtotal	15	58	184	26	11

Construct Parts Store 40,000 sq ft 80,000 sq ft

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Dozer	1	4	4	299	0.58	0.68	2.7	8.38	0.93	0.402	4	17	51	6	2
Grader	1	4	4	135	0.58	0.68	2.7	8.38	0.93	0.402	2	7	23	3	1
Skid steer loader	2	4	28	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	4	18	43	7	4
Backhoe/loader	1	6	28	98	0.21	0.99	3.49	6.9	0.85	0.722	8	27	53	6	6
Small diesel engines	1	4	28	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	4	6	1	0
Dump truck	8	1	4	275	0.21	0.68	2.7	8.38	0.89	0.402	3	11	34	4	2
										Subtotal	21	84	209	26	15

Foundation (slab)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Skid steer loader	2	2	14	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	5	11	2	1
Concrete truck	4	4	9	250	0.21	0.68	2.7	8.38	0.89	0.402	11	45	140	15	7
Dump truck	6	6	9	275	0.21	0.68	2.7	8.38	0.89	0.402	28	111	346	37	17
Delivery truck	1	1	29	180	0.21	0.68	2.7	8.38	0.89	0.402	2	7	20	2	1
Backhoe/loader	1	8	3	98	0.21	0.99	3.49	6.9	0.85	0.722	1	4	8	1	1
Small diesel engines	2	2	52	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	2	8	10	2	1
										Subtotal	45	179	534	58	27

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Small diesel engines	2	4	15	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	5	6	1	1
Delivery truck	1	2	19	180	0.21	0.68	2.7	8.38	0.89	0.402	2	9	27	3	1
Skid steer loader	2	4	61	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	9	39	93	15	8
Concrete truck	4	4	6	250	0.21	0.68	2.7	8.38	0.89	0.402	8	30	93	10	4
Crane	1	8	9	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	3	7	46	8	2
										Subtotal	22	90	265	37	16

Construct Engine Shop Addition 9,000 sq ft 25,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Dozer	1	4	1	299	0.58	0.68	2.7	8.38	0.93	0.402	1	4	13	1	1
Grader	1	4	1	135	0.58	0.68	2.7	8.38	0.93	0.402	0	2	6	1	0
Skid steer loader	2	4	6	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	4	9	2	1
Backhoe/loader	1	6	6	98	0.21	0.99	3.49	6.9	0.85	0.722	2	6	11	1	1
Small diesel engines	1	4	6	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	1	1	0	0
Dump truck	8	1	1	275	0.21	0.68	2.7	8.38	0.89	0.402	1	3	9	1	0
										Subtotal	5	19	49	6	3

Foundation (slab)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Skid steer loader	2	2	2	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	0	1	2	0	0
Concrete truck	4	1	5	250	0.21	0.68	2.7	8.38	0.89	0.402	2	6	19	2	1
Dump truck	6	1	2	275	0.21	0.68	2.7	8.38	0.89	0.402	1	4	13	1	1
Delivery truck	6	6	2	180	0.21	0.68	2.7	8.38	0.89	0.402	4	16	50	5	2
Backhoe/loader	1	8	2	98	0.21	0.99	3.49	6.9	0.85	0.722	1	3	5	1	1
Small diesel engines	2	2	11	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	2	2	0	0
										Subtotal	8	31	91	10	5

F-35 Beddown Construction Air Emissions

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Small diesel engines	2	4	2	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	1	1	0	0
Delivery truck	1	2	5	180	0.21	0.68	2.7	8.38	0.89	0.402	1	2	7	1	0
Skid steer loader	2	4	7	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	5	11	2	1
Dump truck	2	1	1	275	0.21	0.68	2.7	8.38	0.89	0.402	0	1	2	0	0
Crane	1	8	5	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	2	4	26	4	1
										Subtotal	3	12	46	7	3

Construct East Ramp 2.97 acres 129,167 sq ft

Site prep (grading, compacting, drainage, etc.)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Dozer	2	8	3	299	0.58	0.68	2.7	8.38	0.93	0.402	12	50	154	17	7
Backhoe/loader	3	8	33	98	0.21	0.99	3.49	6.9	0.85	0.722	36	125	248	31	26
Grader	3	8	6	135	0.58	0.68	2.7	8.38	0.93	0.402	17	67	208	23	10
Small diesel engines	3	8	33	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	6	31	39	7	3
Dump truck (12 CY)	32	1	33	275	0.21	0.68	2.7	8.38	0.89	0.402	91	363	1127	120	54
										Subtotal	162	636	1776	197	101

Concrete apron construction

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Skid steer loader	4	4	33	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	9	42	100	17	8
Concrete truck (9 CY)	24	1	23	250	0.21	0.68	2.7	8.38	0.89	0.402	43	173	535	57	26
Dump truck (12 CY)	2	0.5	9	275	0.21	0.68	2.7	8.38	0.89	0.402	1	3	10	1	0
Delivery truck	2	1	8	180	0.21	0.68	2.7	8.38	0.89	0.402	1	4	11	1	1
Backhoe/loader	2	8	33	98	0.21	0.99	3.49	6.9	0.85	0.722	24	84	165	20	17
										Subtotal	78	305	822	96	52

Demolish Bldgs 441, 413 and 415 (multi-story) 65,722 SF

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Dozer	3	8	42	90	0.59	0.99	3.49	6.9	0.93	0.722	117	412	814	110	85
Skid steer loader	2	8	42	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	12	54	128	21	11
Crane	1	8	8	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	2	6	41	7	2
										Subtotal	131	472	983	138	98

Equipment	Number	Hr/day	# days	Hp		VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Backhoe/loader	2	8	50	98	0.21	0.99	3.49	6.9	0.85	0.722	36	127	250	31	26
Skid steer loader	2	8	50	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	14	64	152	25	13
Dump truck	8	2	50	275	0.21	0.68	2.7	8.38	0.89	0.402	69	275	854	91	41
										Subtotal	119	466	1,256	147	80

Truck transport of debris to disposal site

Equipment	Number	# days	Trip Length	ROG lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM_{10} lb/mi	$PM_{2.5}$ lb/mi	ROG lb	CO lb	NOx lb	SOx lb	PM_{10} lb	$PM_{2.5}$ lb
Trucks	8	50	30	0.00373	0.01446	0.05	0.00004	0.00231	0.00204	45	174	566	0	28	24

PM_{10} tons/acre/mo	acres	days of disturbance	PM_{10} Total	$PM_{2.5}/PM_{10}$ Ratio	$PM_{2.5}$ Total
0.42	2	140	3.9	0.1	0.4

	VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
2011 Annual Total in Tons	0.50	1.96	5.41	0.61	4.25	0.72

F-35 Beddown Construction Air Emissions

2013

Construct East Ramp 11.4 acres 495,140 sq ft

Site prep (grading, compacting, drainage, etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Dozer	2	8	14	299	0.58	0.68	2.7	8.38	0.93	0.402	58	231	718	80	34
Backhoe/loader	3	8	124	98	0.21	0.99	3.49	6.9	0.85	0.722	134	471	932	115	97
Grader	3	8	21	135	0.58	0.68	2.7	8.38	0.93	0.402	59	235	729	81	35
Small diesel engines	3	8	124	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22	116	148	26	13
Dump truck (12 CY)	32	1	124	275	0.21	0.68	2.7	8.38	0.89	0.402	344	1364	4234	450	203
										Subtotal	616	2417	6760	751	383

Concrete apron construction

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Skid steer loader	4	4	124	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	35	159	377	63	32
Concrete truck (9 CY)	24	1	88	250	0.21	0.68	2.7	8.38	0.89	0.402	166	660	2048	218	98
Dump truck (12 CY)	2	0.5	33	275	0.21	0.68	2.7	8.38	0.89	0.402	3	11	35	4	2
Delivery truck	2	1	29	180	0.21	0.68	2.7	8.38	0.89	0.402	3	13	41	4	2
Backhoe/loader	2	8	124	98	0.21	0.99	3.49	6.9	0.85	0.722	89	314	621	77	65
										Subtotal	297	1158	3123	365	199

Construct Live Ordnance Loading Area Expansion 167,322 sq ft

Site prep (grading, compacting, drainage, etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Dozer	2	8	5	299	0.58	0.68	2.7	8.38	0.93	0.402	21	83	256	28	12
Backhoe/loader	3	8	45	98	0.21	0.99	3.49	6.9	0.85	0.722	49	171	338	42	35
Skid steer loader	2	4	30	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	4	19	46	8	4
Grader	3	8	8	135	0.58	0.68	2.7	8.38	0.93	0.402	23	89	278	31	13
Small diesel engines	3	8	45	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	8	42	54	10	5
Dump truck (12 CY)	32	1	45	275	0.21	0.68	2.7	8.38	0.89	0.402	125	495	1536	163	74
										Subtotal	229	899	2508	281	143

Concrete apron construction

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Skid steer loader	4	4	45	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	13	58	137	23	12
Concrete truck (9 CY)	24	1	32	250	0.21	0.68	2.7	8.38	0.89	0.402	60	240	745	79	36
Dump truck (12 CY)	2	0.5	12	275	0.21	0.68	2.7	8.38	0.89	0.402	1	4	13	1	1
Delivery truck	2	1	11	180	0.21	0.68	2.7	8.38	0.89	0.402	1	5	15	2	1
Small diesel engines	4	6	32	25	0.43	1.7	5	8.5	0.93	0.9	31	91	155	17	16
Backhoe/loader	2	8	45	98	0.21	0.99	3.49	6.9	0.85	0.722	32	114	225	28	24
										Subtotal	139	512	1290	150	89

Weapons School Addition at Bldg 282 10,000 sq ft 11,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Dozer	1	4	2	299	0.58	0.68	2.7	8.38	0.93	0.402	2	8	26	3	1
Grader	1	4	2	135	0.58	0.68	2.7	8.38	0.93	0.402	1	4	12	1	1
Skid steer loader	2	4	5	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	3	8	1	1
Backhoe/loader	1	6	5	98	0.21	0.99	3.49	6.9	0.85	0.722	1	5	9	1	1
Small diesel engines	1	4	5	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	1	1	0	0
Dump truck	8	1	2	275	0.21	0.68	2.7	8.38	0.89	0.402	1	6	17	2	1
										Subtotal	7	26	72	9	4

Foundation (slab)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Skid steer loader	2	2	10	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	3	8	1	1
Concrete truck	4	1	13	250	0.21	0.68	2.7	8.38	0.89	0.402	4	16	50	5	2
Dump truck	4	1	10	275	0.21	0.68	2.7	8.38	0.89	0.402	3	14	43	5	2
Delivery truck	6	6	10	180	0.21	0.68	2.7	8.38	0.89	0.402	20	81	251	27	12
Backhoe/loader	1	8	10	98	0.21	0.99	3.49	6.9	0.85	0.722	4	13	25	3	3
Small diesel engines	2	2	40	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	6	8	1	1
										Subtotal	33	133	385	42	20

Structure

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Small diesel engines	2	4	3	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	1	1	0	0
Delivery truck	1	2	8	180	0.21	0.68	2.7	8.38	0.89	0.402	1	4	11	1	1
Skid steer loader	2	4	13	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	2	8	20	3	2
Dump truck	2	1	3	275	0.21	0.68	2.7	8.38	0.89	0.402	1	2	6	1	0
Crane	1	8	5	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	2	4	26	4	1
										Subtotal	5	19	64	10	4

F-35 Beddown Construction Air Emissions

Construct Three (3) F-35 Munitions Igloos — 7,200 sq ft — 30,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO2** g/hp-hr	**PM** g/hp-hr	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM** lb
Dozer	1	4	2	299	0.58	0.68	2.7	8.38	0.93	0.402	2	8	26	3	1
Grader	1	4	2	135	0.58	0.68	2.7	8.38	0.93	0.402	1	4	12	1	1
Skid steer loader	2	4	10	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	6	15	3	1
Backhoe/loader	1	6	10	98	0.21	0.99	3.49	6.9	0.85	0.722	3	10	19	2	2
Small diesel engines	1	4	10	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	2	2	0	0
Dump truck	8	1	2	275	0.21	0.68	2.7	8.38	0.89	0.402	1	6	17	2	1
										Subtotal	9	35	90	11	6

Foundation (slab)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO2** g/hp-hr	**PM** g/hp-hr	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM** lb
Skid steer loader	2	2	15	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	5	11	2	1
Concrete truck	4	1	6	250	0.21	0.68	2.7	8.38	0.89	0.402	2	8	23	2	1
Dump truck	8	1	3	275	0.21	0.68	2.7	8.38	0.89	0.402	2	8	26	3	1
Delivery truck	6	6	5	180	0.21	0.68	2.7	8.38	0.89	0.402	10	41	126	13	6
Backhoe/loader	1	8	3	98	0.21	0.99	3.49	6.9	0.85	0.722	1	4	8	1	1
Small diesel engines	2	2	15	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	2	3	1	0
										Subtotal	17	67	196	22	10

Structure

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO2** g/hp-hr	**PM** g/hp-hr	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM** lb
Small diesel engines	2	4	9	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	3	4	1	0
Delivery truck	1	1	24	180	0.21	0.68	2.7	8.38	0.89	0.402	1	5	17	2	1
Skid steer loader	2	4	36	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	5	23	55	9	5
Dump truck	2	1	9	275	0.21	0.68	2.7	8.38	0.89	0.402	2	6	19	2	1
Crane	1	8	6	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	2	5	31	5	2
										Subtotal	10	42	125	19	8

Construct Bomb Build-Up Pad — 30,000 sq ft

Grading/Gravel

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO2** g/hp-hr	**PM** g/hp-hr	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM** lb
Grader	2	4	10	135	0.58	0.68	2.7	8.38	0.93	0.402	9	37	116	13	6
Skid steer loader	2	6	10	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	2	10	23	4	2
Small diesel engines	2	4	10	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	3	4	1	0
Dump truck (12 CY)	5	0.5	10	275	0.21	0.68	2.7	8.38	0.89	0.402	2	9	27	3	1
										Subtotal	14	59	169	20	9

Paving

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO2** g/hp-hr	**PM** g/hp-hr	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM** lb
Grader	1	4	5	150	0.59	0.68	2.7	8.38	0.93	0.402	3	11	33	4	2
Roller	2	4	5	30	0.59	1.8	5	6.9	1.00	0.8	3	8	11	2	1
Paver	1	8	5	107	0.59	0.68	2.7	8.38	0.93	0.402	4	15	47	5	2
Delivery truck	2	1	10	180	0.21	0.68	2.7	8.38	0.89	0.402	1	5	14	1	1
										Subtotal	10	38	104	12	6

Volume of hot mix asphalt	9990 ft^3
Average density of HMA	145 lb/ft^3
CARB EF for HMA	0.04 lb/ton
VOC emissions from HMA paving	29 lb

F-35 Beddown Construction Air Emissions

Construct Parking Areas — 190,301 sq ft

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Grader	1	4	7	135	0.58	0.68	2.7	8.38	0.93	0.402	3	13	41	4	2
Roller	2	4	7	30	0.59	1.8	5	6.9	1.00	0.8	4	11	15	2	2
Paver	1	8	7	107	0.59	0.68	2.7	8.38	0.93	0.402	5	21	65	7	3
Concrete truck	4	3	16	250	0.21	0.68	2.7	8.38	0.89	0.402	15	60	186	20	9
Delivery truck	1	2	16	180	0.21	0.68	2.7	8.38	0.89	0.402	2	7	22	2	1
Small diesel engines	4	6	32	25	0.43	1.7	5	8.5	0.93	0.9	31	91	155	17	16
										Total	60	203	484	53	33

63,270 ft^3

Average density of HMA	145 lb/ft^3
CARB EF for HMA	0.04 lb/ton
VOC emissions from HMA paving	183 lb

Pavement Marking 2,000 LF

4" Solid Line= 215 ft/gal VOC content of paint = 1.3 lb/gal

VOC lb
12

PM_{10} tons/acre/mo	acres	days of disturbance	PM_{10} Total	$PM_{2.5}/PM_{10}$ Ratio	$PM_{2.5}$ Total
0.42	5.0	195	13.7	0.1	1.4

	VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
2013 Annual Total in Tons	0.84	2.80	7.69	0.87	14.11	1.82

2014

Construct Low Observables Composite Addition — 11,018 sq ft — 186,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Dozer	1	4	10	299	0.58	0.68	2.7	8.38	0.93	0.402	10	41	128	14	6
Grader	1	4	9	135	0.58	0.68	2.7	8.38	0.93	0.402	4	17	52	6	2
Skid steer loader	2	4	30	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	4	19	46	8	4
Backhoe/loader	1	6	30	98	0.21	0.99	3.49	6.9	0.85	0.722	8	29	56	7	6
Small diesel engines	1	4	30	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	5	6	1	1
Dump truck	8	1	10	275	0.21	0.68	2.7	8.38	0.89	0.402	7	28	85	9	4
										Subtotal	35	138	374	45	23

Foundation

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Skid steer loader	2	2	8	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	3	6	1	1
Concrete truck	4	4	10	250	0.21	0.68	2.7	8.38	0.89	0.402	13	50	155	16	7
Dump truck	6	6	5	275	0.21	0.68	2.7	8.38	0.89	0.402	16	62	192	20	9
Delivery truck	1	1	22	180	0.21	0.68	2.7	8.38	0.89	0.402	1	5	15	2	1
Backhoe/loader	1	8	1	98	0.21	0.99	3.49	6.9	0.85	0.722	0	1	3	0	0
Small diesel engines	2	2	35	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	5	7	1	1
										Subtotal	30	121	371	40	18

Structure

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Small diesel engines	2	4	20	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	6	8	1	1
Delivery truck	1	2	12	180	0.21	0.68	2.7	8.38	0.89	0.402	1	5	17	2	1
Skid steer loader	2	4	60	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	9	39	91	15	8
Dump truck	6	6	15	275	0.21	0.68	2.7	8.38	0.89	0.402	47	186	576	61	28
Crane	1	8	5	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	2	4	26	4	1
										Subtotal	59	240	718	84	38

F-35 Beddown Construction Air Emissions

Construct 4-Bay F-35 Hangar/Strike Aircraft Maintenance Unit Building 31,000 sq ft 62,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Dozer	1	4	8	299	0.58	0.68	2.7	8.38	0.93	0.402	8	33	103	11	5
Grader	1	4	5	135	0.58	0.68	2.7	8.38	0.93	0.402	2	9	29	3	1
Skid steer loader	2	4	15	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	2	10	23	4	2
Backhoe/loader	1	6	15	98	0.21	0.99	3.49	6.9	0.85	0.722	4	14	28	3	3
Small diesel engines	1	4	15	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	2	3	1	0
Dump truck	8	1	5	275	0.21	0.68	2.7	8.38	0.89	0.402	3	14	43	5	2
										Subtotal	21	82	228	27	13

Foundation (slab)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Skid steer loader	2	2	20	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	6	15	3	1
Concrete truck	5	1	13	250	0.21	0.68	2.7	8.38	0.89	0.402	5	20	63	7	3
Dump truck	6	1	8	275	0.21	0.68	2.7	8.38	0.89	0.402	4	17	51	5	2
Delivery truck	1	1	44	180	0.21	0.68	2.7	8.38	0.89	0.402	2	10	31	3	1
Backhoe/loader	1	8	8	98	0.21	0.99	3.49	6.9	0.85	0.722	3	10	20	2	2
Small diesel engines	2	2	50	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	8	10	2	1
										Subtotal	18	71	190	22	11

Structure

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Small diesel engines	2	4	21	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	7	8	1	1
Delivery truck	1	2	25	180	0.21	0.68	2.7	8.38	0.89	0.402	3	11	35	4	2
Skid steer loader	2	4	86	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	12	55	131	22	11
Concrete truck	4	2	15	250	0.21	0.68	2.7	8.38	0.89	0.402	9	38	116	12	6
Crane	1	8	15	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	5	12	77	13	4
										Subtotal	30	122	368	52	23

Low Observable Composite 2-Bay Hangar 15,800 sq ft 15,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Dozer	1	4	3	299	0.58	0.68	2.7	8.38	0.93	0.402	3	12	38	4	2
Grader	1	4	3	135	0.58	0.68	2.7	8.38	0.93	0.402	1	6	17	2	1
Skid steer loader	2	4	11	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	2	7	17	3	1
Backhoe/loader	1	6	11	98	0.21	0.99	3.49	6.9	0.85	0.722	3	10	21	3	2
Small diesel engines	1	4	11	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	2	2	0	0
Dump truck	8	1	3	275	0.21	0.68	2.7	8.38	0.89	0.402	2	8	26	3	1
										Subtotal	11	45	121	15	8

Foundation (slab)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Skid steer loader	2	2	8	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	1	3	6	1	1
Concrete truck	4	1	9	250	0.21	0.68	2.7	8.38	0.89	0.402	3	11	35	4	2
Dump truck	7	1	5	275	0.21	0.68	2.7	8.38	0.89	0.402	3	12	37	4	2
Delivery truck	6	6	5	180	0.21	0.68	2.7	8.38	0.89	0.402	10	41	126	13	6
Backhoe/loader	1	8	5	98	0.21	0.99	3.49	6.9	0.85	0.722	2	6	13	2	1
Small diesel engines	2	2	24	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	1	4	5	1	0
										Subtotal	19	76	221	24	12

Structure

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Small diesel engines	2	4	6	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	0	2	2	0	0
Delivery truck	1	2	12	180	0.21	0.68	2.7	8.38	0.89	0.402	1	5	17	2	1
Skid steer loader	2	4	20	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	3	13	30	5	3
Dump truck	2	1	11	275	0.21	0.68	2.7	8.38	0.89	0.402	2	8	23	2	1
Crane	1	8	8	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	2	6	41	7	2
										Subtotal	9	34	114	17	7

F-35 Beddown Construction Air Emissions

Construct Parking Areas 96,486 sq ft

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Grader	1	4	7	135	0.58	0.68	2.7	8.38	0.93	0.402	3	13	41	4	2
Roller	2	4	7	30	0.59	1.8	5	6.9	1.00	0.8	4	11	15	2	2
Paver	1	8	7	107	0.59	0.68	2.7	8.38	0.93	0.402	5	21	65	7	3
Concrete truck	4	3	16	250	0.21	0.68	2.7	8.38	0.89	0.402	15	60	186	20	9
Delivery truck	1	2	16	180	0.21	0.68	2.7	8.38	0.89	0.402	2	7	22	2	1
Small diesel engines	4	6	30	25	0.43	0.7628	4.1127	5.2298	0.93	0.9	13	70	89	16	15
										Total	42	182	419	52	32

10,000 ft^3

Average density of HMA	145 lb/ft^3
CARB EF for HMA	0.04 lb/ton
VOC emissions from HMA paving	29 lb

Pavement
Marking 900 LF
1" Solid Line= 215 ft/gal VOC content of paint = 1.3 lb/gal

VOC lb
5

Demolish Bldgs 258 and 250 20,809 SF

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Dozer	1	8	20	90	0.59	0.99	3.49	6.9	0.93	0.722	19	65	129	17	14
Skid steer loader	2	8	20	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	6	26	61	10	5
Crane	1	8	1	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	0	1	5	1	0
										Subtotal	25	92	195	28	19

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	VOC lb	CO lb	NOx lb	SO2 lb	PM lb
Backhoe/loader	2	14	11	98	0.21	0.99	3.49	6.9	0.85	0.722	14	49	96	12	10
Skid steer loader	2	14	11	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	5	25	59	10	5
Dump truck	8	4	11	275	0.21	0.68	2.7	8.38	0.89	0.402	30	121	376	40	18
										Subtotal	50	195	531	61	33

Truck transport of debris to disposal site

Equipment	Number	# days	Trip Length	ROG lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM_{10} lb/mi	$PM_{2.5}$ lb/mi	ROG lb	CO lb	NOx lb	SOx lb	PM_{10} lb	$PM_{2.5}$ lb
Trucks	8	11	30	0.00373	0.01446	0.05	0.00004	0.00231	0.00204	10	38	125	0	6	5

PM_{10} tons/acre/mo	acres	days of disturbance	PM_{10} Total	$PM_{2.5}/PM_{10}$ Ratio	$PM_{2.5}$ Total
0.42	1	90	1.3	0.1	0.1

	VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
2014 Annual Total in Tons	0.20	0.72	1.99	0.23	1.38	0.25

F-35 Beddown - Aircraft Operation Emissions*
Tons/Year

Six F-35 Aircraft:

	VOCs	CO	NOx	SOx	$PM_{10}/PM_{2.5}$
2012					
Aircraft	1	12	28	1	8
AGE	0.51	6.08	3.09	0.24	0.16
Total	**1.51**	**18.08**	**31.09**	**1.24**	**8.16**
2013					
Aircraft	1	12	28	1	8
AGE	0.51	6.08	3.09	0.24	0.16
Total	**1.51**	**18.08**	**31.09**	**1.24**	**8.16**
2014					
Aircraft	1	12	28	1	8
AGE	0.51	6.08	3.09	0.24	0.16
Total	**1.51**	**18.08**	**31.09**	**1.24**	**8.16**
Twelve F-35 Aircraft:					
2015					
Aircraft	2.00	25.00	55.00	3.00	17.00
AGE	1.02	12.16	6.18	0.48	0.32
Total	**3.02**	**37.16**	**61.18**	**3.48**	**17.32**
Twenty-four F-35 Aircraft:					
2017					
Aircraft	4.00	50.00	110.00	6.00	34.00
AGE	2.04	24.32	12.36	0.96	0.64
Total	**6.04**	**74.32**	**122.36**	**6.96**	**34.64**
Thirty-six F-35 Aircraft:					
2022					
Aircraft	6.00	75.00	165.00	8.00	50.00
AGE	3.06	36.48	18.54	1.44	0.96
Total	**9.06**	**111.48**	**183.54**	**9.44**	**50.96**

*Emissions in tons from AGE per year were calculated using the fighter aircraft defaults in the Air Force Conformity Applicability Model (ACAM) 4.3.3 (Air Force 2005). Specific AGE have not been created for this new aircraft, nor have the maintenance and surface repair needs been identified therefore, this represents the best available data available at this time for calculating AGE emissions as they are associated with the F-35. Emissions for the F-35 aircraft F-135 engine were calculated using data provided by the Joint Strike Force Program Office (October 2007) in charge of design and development of the F-35 aircraft. Because the aircraft is still in the research stage and no operational aircraft and/or engines have been built, the emissions are based on the one research engine in operation at the time of this EIS analysis. If applicable, new air emissions calculations will be evaluated once the operating engines are brought into production and being used.

Department of Air Quality & Environmental Management

500 S Grand Central Parkway 1st Fl • Box 555210 • Las Vegas NV 89155-5210
(702) 455-5942 • Fax (702) 383-9994

Alan Pinkerton, Deputy Director • Lewis Wallenmeyer, Acting Director

February 12, 2008

Bruce W. MacDonald, P.E.
Department of the Air Force
Headquarters Air Combat Command
Langley AFB VA, 23665

Re: F-35 Beddown at Nellis AFB

Dear Mr. MacDonald:

The Clark County Department of Air Quality and Environmental Management (DAQEM) is in receipt of your letter dated January 16, 2008 with regard to Headquarters Air Combat Command's request that our agency include nitrogen oxide (NO_X) emissions from the planned F-35 Beddown at Nellis AFB in the Ozone State Implementation Plan for Clark County.

Before Air Force staff met with DAQEM regarding this request, DAQEM had already completed the ozone modeling analysis for the nonattainment area in Clark County, which includes the majority of Nellis AFB. Emissions from the proposed F-35 Beddown were therefore not included in that analysis. After reviewing the proposed emissions detailed in the letter of request, DAQEM is confident that the emissions can be incorporated in the SIP.

The ozone modeling was extensive, and at this time DAQEM is not intending to remodel. DAQEM is, however, committed to incorporating discussion of the emissions from the Nellis expansion and explain how such emissions would have little impact on the nonattainment area. DAQEM believes this should be satisfactory to EPA. If EPA requests a formal modeling reanalysis, DAQEM would accommodate that request.

It is important to note, however, that EPA is scheduled to promulgate a new ozone standard in March 2008, and issue reclassifications of the current 8-hour ozone standard in 2009. DAQEM does not know at this time how those actions may impact the County's attainment demonstration. DAQEM staff is meeting with EPA Region 9 later this month to discuss these issues, but it is anticipated that only preliminary information will be obtained.

DAQEM is committed to working with the Air Force as is within the agency's means and within EPA direction. DAQEM will contact and coordinate with your staff if concerns arise.

Please contact me if you have any questions.

Sincerely,

Stephen Deyo

Stephen Deyo
Assistant Planning Manager, DAQEM

cc: Sheryl K. Parker, Langley AFB
Shimi Mathew, Nellis AFB
Dennis Ransel, DAQEM

APPENDIX E
STATE AND FEDERAL LISTED SPECIES POTENTIALLY FOUND WITHIN THE NEVADA TEST AND TRAINING RANGE (NTTR)

APPENDIX E
STATE AND FEDERAL LISTED SPECIES POTENTIALLY FOUND WITHIN THE NEVADA TEST AND TRAINING RANGE (NTTR)

The following provides a list of all state and federally listed plant species potentially found within the NTTR. These lists include the common and scientific names, state and federal rankings, and brief description of potential habitat where the species in commonly found.

Table E-1 Special Status Plant Species Known or Likely to Occur on NTTR (page 1 of 3)

Scientific Name *Common Name*	*Regulatory Status*[1]	*Heritage Rank*[2]	*Description, Flowering, Period*	*Distribution and Habitat (reference)*
Arctomecon californica Las Vegas bearpoppy	SOC, CE		Cespitose perennial herb, with 6-20 yellow flowers on each stalk; flowers April-May	On barren slopes, flats, and hummocks, often on gypsum soils, in creosote bush scrub, 1,310-2,760 feet.
Artomecon merriami Merriam's bearpoppy	SOC, BLM	G3S2	Clumped perennial herb, with white flowers borne singly on stalks; flowers April-June	Shallow gravelly soils, limestone outcrops, flats and dry lake beds, in various Mojave Desert scrub communities, 2,000-6,300 feet.
Asclepias eastwoodiana Eastwood milkweed	SOC, BLM	G2S2	Low, few-stemmed perennial herb from woody caudex; flowers May-June	Occurs in low alkaline clay hills or shallow, gravelly drainages, in shadscale scrub, 5,300-6,900 feet.
Astragalus amphioxus var. *musimonum* Sheep Range milkvetch	SOC, BLM	G5T2S2	Low tufted perennial herb; flowers April-June	On dry limestone bajadas, gentle slopes, disturbed areas, in mixed Mojave Desert scrub and pinyon-juniper woodland, 4,400-6,400 feet.
Astragalus beatleyae Beatly milkvetch	SOC, CE	G2S2	Dwarf, cespitose perennial herb; flowers in May	On shallow, gravelly rhyolitic tuff soil, in barren areas, mixed scrub, and pinyon-juniper woodland, 5,600-6,800 feet.
Astragalus funereus Black wollypod	SOC, BLM	G2S2	Mat-forming perennial herb; flowers March-May	On steep, gravelly slopes of volcanic tuff, occasionally on limestone screes, in barren areas and shadscale scrub, 3,200-7,680 feet.
Astragalus mohavensis var. *hemigyrus* Half-ring pod milkvetch	SOC, CE	G3T2S2	Bushy perennial herb; flowers April-June	On limestone ledges and gravelly hillsides, with creosote, juniper, 3,400-6,070 feet.

Table E-1 Special Status Plant Species Known or Likely to Occur on NTTR (page 2 of 3)				
Scientific Name Common Name	***Regulatory Status[1]***	***Heritage Rank[2]***	***Description, Flowering, Period***	***Distribution and Habitat (reference)***
Astragalus oophorus var. *clokeyanus* Clokey eggvetch	SOC		Low, slender perennial herb; flowers June-July	On NTTR in washes bordering pinyon-juniper; elsewhere on ridges and slopes in gravelly limestone soil, in sagebrush scrub, pinyon-juniper woodland, and montane forest, 6,800-9,100 feet.
Camissonia megalantha Cane Spring evening primrose	SOC	G1S2	Annual herb; flowers in May or June-October	In washes on volcanic soils and on a talus seepage slope at Cane Spring, in shadscale scrub.
Castilleja martinii var. *clokeyi* Clokey paintbrush	SOC	G3T2S2	Perennial herb; flowers June-July	On mountains in sagebrush scrub, pinyon-juniper woodland, ponderosa pine-white fir forest, 6,200-9,000 feet.
Cymopterus ripleyi var. *saniculoides* Sanicle biscuitroot	SOC, BLM	G1S1	Perennial herb; flowers in April-June	On sand dunes, sandy soil, volcanic tuff, in shadscale scrub, 3,900-6,800 feet.
Erigeron ovinus Sheep fleabane	SOC, BLM	G1S1	Perennial herb from taproot; flowers in June	On limestone outcrops in pinyon-juniper woodland, 6,200-8,400 feet.
Erigonium corymbostem var. *glutinosum* Golden buckwheat	SOC	G5T3 S1S2	Large yellow-flowered shrub; flowers July-October	On fire or sandy soils in mixed desert shrub communities.
Frasera pahutensis Pahute green gentian	SOC, BLM	G2S2	Low, spreading perennial herb arising from woody rootstocks; flowers May-July	On gravelly slopes and valley bottoms, in pinyon-juniper woodland, 7,200-7,900 feet.
Galium hilendiae ssp. kingstonense Kingston bedstraw	SOC, BLM	G4T2S2	Dioecious, mat-forming, weak-stemmed perennial subshrub; flowers in June	On loose, rocky soil in ravines and gullies, in sagebrush scrub, pinyon-juniper woodland, 5,500-6,500 feet.
Penstemon pahutensis Pahute Mesa beardtongue	SOC, BLM	G2S2	Perennial herb arising from root crown; flowers June-July	On loose soil, rock areas; in barren areas and pinyon-juniper woodland, 5,800-7,500 feet.
Perityle megalocephala var. *intricata* Delicate Rock Daisy	SOC, BLM	G3S3	Perennial shrub flowers April-September	Creosote bush shrub, crevices or rubble of carbonate outcrops, 2,600-6,000 feet.
Phacelia beatleyae Beatley's phacelia	SOC, BLM	G2S2	Diminutive annual herb; flowers April-May	On gravel or volcanic tuff, along washes and in canyons, also on slopes. In barren areas, creosote bush scrub, shadscale scrub, 2,500-5,800 feet.

Table E-1 Special Status Plant Species Known or Likely to Occur on NTTR (page 3 of 3)

Scientific Name *Common Name*	*Regulatory Status*[1]	*Heritage Rank*[2]	*Description, Flowering, Period*	*Distribution and Habitat (reference)*
Phacelia parishii Parish's phacelia	SOC, BLM		Low-spreading annual herb; flowers in May	Playas, shadscale scrub, 3,000-3,200 feet.

Source: Air Force 1999a

[1] Status abbreviated as follows:

Federal Status

FC = Candidate for federal listing as threatened or endangered.
SOC = Federal Species of Concern, indicating former candidate status and potential for reconsideration in the future.
BLM = Listed on Nevada BLM Sensitive Species List (4/97).

State Status

CE = Listed as Critically Endangered by the Nevada Division of Forestry

[2] TNC Rankings (TNC 1997) abbreviated as follows:

G = Global rank indicator, based on worldwide distribution at the species level.
T = Trinomial rank indicator, based on worldwide distribution at the infraspecific level.
S = State rank indicator, based on distribution within Nevada at the lowest taxonomic level.

1 = Critically imperiled due to extreme rarity, imminent threats, or biological factors.
2 = Imperiled due to rarity or other demonstrable factors.
3 = Rare and local throughout its range, or with very restricted range, or otherwise vulnerable to extinction.
4 = Apparently secure, though frequently quite rare in parts of its range, especially at the periphery.
5 = Demonstrably secure, though frequently quite rare in parts of its range, especially at the periphery.

Table F-2 Special Status Wildlife Species Known or Likely to Occur on NTTR (page 1 of 2)			
Species	***Status***		***Occurrence on Range, Overflight Areas***
	Federal	*State*	
Threatened or Endangered Species			
Desert tortoise *(Gopherus agassizii)*	T	T	Present in low densities throughout Mojave Desert scrub habitat.
Special Status Species			
Pygmy rabbit *(Brachylagus idahoensis)*	SOC		Found in sagebrush communities where stands are dense, alluvial habitat is preferred. Potentially occurs on NTTR.
Spotted bat *(Euderma maculatum)*	SOC	T	Found in various habitats from desert to mountain coniferous forest but always in association with nearby high cliff faces. Observed on the NTS and potentially occurs on NTTR.
Peregrine falcon *(Falco peregrinus)*	SOC		Expected as a rare transient. No records of breeding on NTTR.
Western small-footed myotis *(Myotis ciliolabrum)*	SOC, BLM		Occurs in a variety of habitats but most common in arid environments. Roosts primarily in caves, buildings, mines, or crevices. Observed on the NTS and potentially occurs on NTTR.
Long-eared myotis *(Myotis evotis)*	SOC, BLM		Occurs primarily in forests by also less frequently in sage and chaparral habitats. Roosts in cracks in cliffs, hollow trees, caves, mines and buildings. Observed on the NTS and potentially occurs on NTTR.
Fringed myotis *(Myotis thysanodes)*	SOC, BLM		Found in desert scrub, shrub-steppe, oak-pinyon and coniferous forest habitats. Roosts in caves, rock crevices and buildings. Observed on NTTR.
Long-legged myotis *(Myotis volans)*	SOC, BLM		Typically associated with montane forests but also found in riparian and desert habitats. Roosts in rock crevices in cliffs, cracks in ground, behind loose bark on trees, and buildings. Observed on NTTR.
Townsend's big-eared bat *(Corynorhinus townsendii pallescens)*	SOC, BLM		Roosts in caves, mines and buildings.
Least bittern *(Ixobrychus exilis hesperis)*	SOC		Observed in wetlands of Pahranagat Valley. Expected in small ponds on NTTR infrequently in small numbers.
White-faced ibis *(Plegadis chihi)*	SOC		Observed in wetlands of Pahranagat Valley. Expected in small ponds on NTTR infrequently in small numbers.
Ferruginous hawk *(Buteo regalis)*	SOC		Spring and fall migrant and winter visitor in low numbers. No records of breeding on NTTR.

Table F-2 Special Status Wildlife Species Known or Likely to Occur on NTTR (page 2 of 2)			
Species	*Status*		*Occurrence on Range, Overflight Areas*
	Federal	*State*	
Black tern (*Childonias niger*)	SOC, BLM		Observed at wetlands in Pahranagat Valley. Spring and fall migrant and summer visitor to the region and possibly the NTTR.
Burrowing owl (*Athene cunicularia*)	SOC	P	A spring and fall migrant and breeder on the NTTR. Recorded on NTTR in Great Basin desert scrub and expected in slightly disturbed areas. Observed and/or occurs on Nellis AFB.
Phainopepla (*Phainopepla nitens*)	BLM	P	A permanent resident of Mojave Desert scrub and desert spring habitats. Observed on NTTR. Observed and/or occurs on Nellis AFB.
Chuckwalla (*Sauromalus obesus*)	SOC, BLM		Expected in rocky hillsides and rock outcrops within the Mojave Desert scrub community. Observed and/or occurs on Nellis AFB.

Notes: E = Endangered
T = Threatened
SOC = Federal Species of Concern
BLM= Nevada BLM Sensitive Species List
CE = Listed as Critically Endangered by Nevada Department of Wildlife
P = Protected by the Nevada Department of Wildlife

Source: Air Force 1999a